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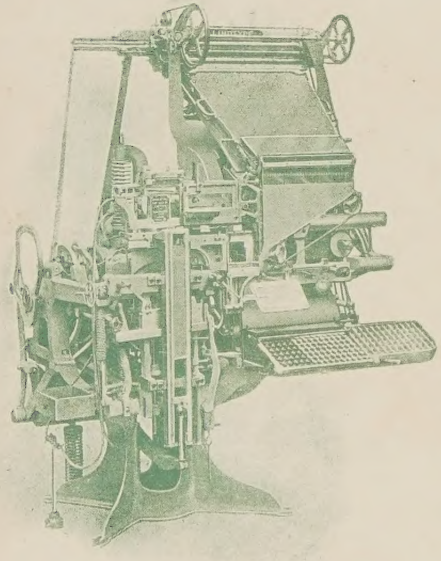

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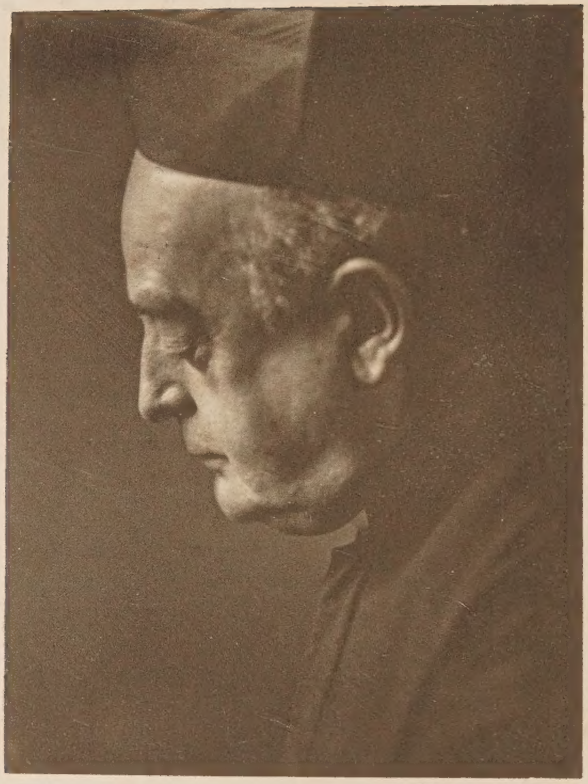

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Index to Articles.

Title.	Author.	Page.
Amphitype Process, The	Henry L. Shawcross, B.Eng.	173
Artistic Side of Our Profession, The	Leo Hagedoorn	65
Artists' Department, The	Hazlitt Gilmour	47
Autochromes and their Reproduction on Paper	Howard Farmer	161
Autochromy and Typography	Harold Hood, F.R.P.S.	69
Automatic Focussing	Arthur Fruwirth	105
Beauty and the Camera, with Special Reference to the Work of Elwin Neame	Chas. E. Dawson	57
Carbon Black Making	H. B. Holding	89
Carbon Process and its Applications, Discursive Notes on the	E. W. Foxlee	25
Collotype for Post-Card Printing, Hints on	S. G. Yerbury	71
Colour a Creature of the Mind bound by Physical Conditions	Emanuel F. Wagner	159
Colour Collotype	Arthur Jaffé	142
Colour Schemes	J. S. Sunderland	140
Colour Sensitizers and Filter Dyes	Dr. E. Koenig	73
Commercial Photo-Ceramics	W. T. Wilkinson	86
Comparative Quality of Printing Inks: Some Simple Tests	A. W. Morris	53
Costly Cheapness in Electros, A	Frank Colebrook	127
Die Press for Gravure Printing, Possibilities of the	Chas. Dawson	41
"Dry Plate" *v.* "Emulsion"	C. W. Perry	157
Economy in Colour Printing	Ilston Cox	33
Experience with the Acid Blast	Herman J. Schmidt	77
Fancy Borders, On	F. Fissi	94
Four Subjects on One Plate	Ernest Marriage, F.R.P.S.	37
Gelatine Paper Troubles in the Tropics	S. K. Lawton	136
Get it in the Negative	S. H. Horgan	87
Graphical Construction for Determining the Optical Constants of a Thick Lens, A	Reginald S. Clay, D.Sc.	145
Graphic Plate, The	J. Gaskin Wood	104
Graph Process of Photo-Copying, The	R. B. Fishenden	165
Half-Tone Blocks in Newspapers	A. J. Newton	92
Has the Woodcut Passed?	Thos. Nisbet	23
How Static Electricity Annoys the Electrotyper	George E Dunton	97
How to Use the Fixed Screen with the Best Result	Chas. J. Harris	112
Industrial Application of Collotype, The	Julius Danesi	180
Life in Solids, The	C. S. Best	119
Line Drawings for Newspaper Advertisements: The Selfridge Cartoons	Chas. E. Dawson	17
Litho-Zinc and Metal Plate Printing	G. H. Block	168
May I Teach My Grandmother to ——?	H. Hands	21
My Experiences with the Omnicolor Plate	Prof. E. Valenta	124
New Colour Process, A, and its Possibilities	..	175
Novel Engraving Process, A	The Editor	182
Now and Then: A Retrospect	H. W. Bretherick	185
Off-set Press Applied to Photochrome, The	J. Widdop	152
Offset Printing	..	177
On taking Tricolour Negatives with a Single Exposure Tricolour Camera	E. T. Butler	43
Originals for Quick and Easy Reproduction	W. J. Smith	163
Orthochromatic Filters	C. E. Kenneth Mees, D.Sc.	153
Panchromatizing of Dry Plates, The	Prof. Rodolfo Namias	129
Passing Show, The	Louis Flader	113
Paynetype: The Direct Photo-Engraving Process	Arthur Payne	81
Philosophy of Colour, The, and Chemistry of the Principal Colour-Pigments	Chas. T. Kock	193
Photographing Articles made of Cut Glass, A Practical Hint for	Edward T. Warner	22
Photography for Printers	Frank W. Adams	49
Photo-Lithography and Half-Tone Posters	R. E. Wilkinson	117
Photo-Mechanical Colour Printing *v.* Chromo-Lithography	C. G. Zander, F.R.P.S.	61
Pictured Mathematics	N. S. Amstutz	169
Powder Process, A Comparatively New	W. W. Wall	21
Practical Process of Three-Colour Etching, A	Alfredo Mangiagalli	133
"Press Person, The"	John P. Glover	30
Process Shop for the Small Firm, A	E. A. Bawtree	191

Title.	Author.	Page.
Progress of Offset Printing, The		200
Rehabilitation of Lithography, The	Joseph Goodman	121
Reproduction of Chromotypes Obtained with Autochrome Plates	A. Seyewetz	149
Sensitive Asphaltum	Maj.-Gen. J. Waterhouse, I.A.	78
Simple Method of Regulating Exposures, A	Charles Gravier	109
Wet Blackleading for Electrotyping Half-Tones	The Editor	186
"What of the Future?"	Frederic T. Corkett	35
Wholesale Engraving	A. E. Dent	63
Wrinkles on Redcol	G. C. Laws	137
Year's Progress in Process Work, The	The Editor	9

Index of Illustrations.

Plates.

		Engravers, Etc.	
Father Bernard Vaughan	Photogravure	Intaglio Patents Ltd.	Frontispiece
Madonna Della Sedia	Steel Plate Engraving	P. Lightfoot, Sc.	176

Colour Prints.

Title.	Process.	Engraver.	Following Page
"After Guido"	Three-Colour	E. Hamel & Co.	120
Autotypie		J. W. Zanders	Advt. xvi
Autumn	Three-Colour	Polytechnic School	160
Capri. Landscape	Three-Colour	Danesi	180
Castle of Chillon, The	Three-Colour	Taylor Bros.	108
Catalogue Illustration	Two-Colour	Entwistle, Thorpe & Co	164
Cover Design, A	Two-Colour	A. E. Dent & Co., Ltd.	120
Critic, The	Two-Colour	The Grout Engraving Co.	112
Expressions	Two-Colour	Gatchell & Manning	188
Fashion Work	Two-Colour	The London Etching Co.	196
Garden Scene, A	Three-Colour	The Strand Engraving Co., Ltd.	48
Greenhouse Study, A	Four-Colour	Amalgamated Press, Ltd.	148
Hansel and Gretel	Three-Colour	The Zeese-Wilkinson Co.	48
Illustration to "Gulliver's Travels"	Three-Colour	Half-Tone Engraving Co	120
In Hackfall Glen, Yorks.	Two-Colour		32
In Realms of Fancy	Two-Colour	André & Sleigh, Ltd.	40
John Bull	Three-Colour	London and Provincial Co., Ltd.	116
Lift Cage, Design for a	Three-Colour	The Marshall Engraving Co.	184
Marble	Four-Colour	Press Etching Co.	156
Miss Evelyn Millard	Two-Colour	W. F. Sedgwick, Ltd.	56
Monastery of Montserrat, Catalonie	Three-Colour	J. Furnells	68
Motor Car Illustration, A	Four-Colour	The Electro Tint Engraving Co.	168
"Mouth of the Mersey, The"	Three-Colour	John Swain & Son, Ltd.	32
Old and the New, The	Three-Colour	Emery & Son, Ltd.	96
On the Lake of Garda	Three-Colour	C. Angerer & Göschl	132
Passing Glance, The	Three-Colour	American Colortype Co.	24
Print from Negatives Sensitized with Ethyl Violet and Erythrosine	Four-Colour		128
Print from Pinachrome Sensitized Negatives	Three-Colour		128
Punta della chiappa near Portofino, Riviera Levante	Three-Colour	J. G. Schelter & Giesecke	8
Remarkables, The, Lake Wakatipu, N.Z.	Two-Colour	J. T. Inkersell	76
Right Hon. Herbert Gladstone, M.P.	Two-Colour	Arthur Cox Illustrating Co., Ltd.	52
"Sauciness"	Three-Colour	The Anglo Engraving Co., Ltd.	20
Silvia	Two-Colour	André & Sleigh, Ltd.	12
Single Colour Printing Plate, The		Rheinberg & Co.	176
Sleigh Belle, The	Three-Colour	Stafford & Co., Ltd.	104
Spanish Beauty, A	Five-Colour	Pemsel & Lembke	200
Strawberry Root, A	Three-Colour	The Photochrom Co., Ltd.	56
Stream, The	Four-Colour	André & Sleigh, Ltd.	16
Study, A	Two-Colour	Entwistle, Thorpe & Co.	136
Sunny Corner, A	Three-Colour	A. E. Dent & Co., Ltd.	88
Title Page	Two-Colour		
Tristan and Isolde	Four-Colour	The Zeese-Wilkinson Co.	40
Winter	Two-Colour	De Reproductie Compagnie	64
"Winter on Exmoor"	Three-Colour	The Anglo Engraving Co., Ltd.	16
Would Advertising Help Conscription?	Two-Colour	E. Hamel & Co.	144
Young Fisher, The	Four-Colour	Arc Engraving Co., Ltd.	60

Supplement Illustrations.

Title.	Engraver.	Following Page
Advertisement Design, An. By the Baxter Studio	Acme Tone Engraving Co., Ltd.	120
Alfred, Lord Tennyson	Swan Electric Engraving Co., Ld.	72
American Park, An	Globe Engraving Co., Ltd.	172
Architectural Subject. By Lewis	The Tone Photo-Engraving Co.	88
Artist, The. By E. O. Hoppé	H. Rheinlander & Co.	108
At Sea and Ashore. By J. B. Sablick	Glasgow Photo-Engraving Co.	60
Autumn. By W. van Zanen	"Helios"	36
Baron Campbell von Laurentz. By Reinhold Thiele	S. A. Cattell & Co.	24
"Bobbins," A Portrait Study. By Elwin Neame	The Art Reproduction Co., Ltd.	60
Captain of the Galley Slaves, The. By Langfier	Ashworth & Meredith	108
Castlewellan. By R. Welch	"Western Mail," Ltd.	68
Catalogue Illustration, A	Ashworth & Meredith	160
Catalogue Illustration, A	Electric City Engraving Co.	168
Catalogue Illustration, A	Wallage & Gilbett, Ltd.	152
Catalogue Illustration, A	Wallage & Gilbett, Ltd.	168
Catalogue Illustration	Ashworth & Meredith	160
Catalogue Illustration	C. P. Zacher & Co.	160
Catalogue Illustration	Entwistle Thorpe & Co.	160
Catalogue Illustration	Gilchrist Bros.	152
Catalogue Illustration	Philipson, Son & Skilleter	152
Catalogue Illustration	Wallage & Gilbett, Ltd.	160
Catalogue Page, A	Kleboe & Franklin	120
Cathedral Interior, A	The Strand Engraving Co., Ltd.	56
Cat Study, A	The Strand Engraving Co., Ltd.	48
Child Study. By Frank Adams	Carl Hentschel, Ltd.	88
Cliffords Inn. By Hanslip Fletcher	Half-Tone Engraving Co., Ltd.	24
Cottage, The, Bettws-y-Coed. By Carl Greger	Art Reproduction Co.	104
Cut Glass Ware	W. & G. Baird, Ltd.	168
Day with the Boy Scouts, A. By Reinhold Thiele	Dellagana & Co.	24
Ebb-Tide	The Grout Engraving Co.	16
English Church Architecture. By Godfrey Bingley	A1 Engraving Co.	56
Gas Engine Illustration, A	London and Provincial Co., Ltd.	160
Gertrude Robins. By Elwin Neame	The Art Reproduction Co., Ltd.	60
Gilbert White's Country. By W. T. Green	The Premier Engraving Co.	80
Glencairn, Cape Colony. By Lancelot Usher	Lascelles & Co.	36
Greeting Page	Arthur Cox Illustrating Co., Ltd.	
Half-tone View showing the decorative effect of a Vignette	Electric City Engraving Co.	60
Harford Bridge, on the River Erme, South Devon	"Western Morning News"	80
H. B. Irving in "The Lyons Mail." By Ellis & Walery	Bourne & Co.	108
Henry IV. of France and his Children. By Robert A. Hillingford	Chappelow & Co.	16
High Tor, Matlock. By M. Harrand	Harrand & Fuller	16
H.M. The King. By Fredk. Downer & Sons	The Watford Engraving Co.	40
Illustrating the Method of Producing Perspective View from *any* point to *any* Scale when working drawings only are obtainable	The Tone Photo-Engraving Co.	172
Innocent Youth. By Freckleton & Co.	E. Hamel & Co.	36
Interior. By G. Middendorp	"Helios"	36
In the Solent. By West & Sons	Gilchrist Bros.	72
Lewis Waller as Henry V. By Ellis & Walery	Bourne & Co.	36
Lieutenant Sampson Sladen. By Reinhold Thiele	Lascelles & Co.	36
Life at Girton and Newnham Colleges. By Reinhold Thiele	Lyth Engraving Co.	68
Magazine Advertisement Design, A. By the Carlton Studio	Direct Photo-Engraving Co., Ld.	120
Mars. By E. M. Antoniadi	Geo. Newnes, Ltd.	172
Memories. By Elwin Neame	Entwistle, Thorpe & Co.	60
Miss Alice du Barry. By Foulsham & Banfield	Direct Photo-Engraving Co., Ld.	80
Miss Dorothea Baird. By Alfred Ellis & Walery	T. B. Browne, Ltd.	40
Miss Frances Dillon as "Lysabetta" in "The Proud Prince"	"Daily Mirror" Studios	68
Miss Hilda Antony. By Dover Street Studios	British Photo-Engraving Co.	88
Miss Lilian Ivy Close. By Elwin Neame	Hill & Co.	60
Miss Maud Allen. By E. O. Hoppé	Dean Engraving Co.	88
Miss Maudi Darrell. By Elwin Neame	Arc Engraving Co., Ltd.	56
Miss Zena Dare. By Elwin Neame	Half-Tone Engraving Co., Ltd.	56
Mont Blanc de Seilon, from near Arolla. By. H. H. Connah	Vaus & Crampton, Ltd.	68
Native Women at their Toilet in Zululand. By A. Allerston	F. M. Haygarth	68
Nature's Staircase	Electric City Engraving Co.	96

Title.	Engraver.	Following Page
New "D" Keyboard Composing Machine, Illustration of	.. ..	160
Newspaper Half-Tone, A	"Daily Mirror" Studios	68
Newton-upon-Ouse, near York. By Harold G. Grainger	Carl Hentschel, Ltd.	36
Norland Hall, near Halifax. By J. T. Garside	Blatchford Bros.	128
Norman Arch, Bristol. By W. Gilliard	Northern Art Reproduction Co. and H. Shawcross	172
Novice, The. By Alfred Ellis & Walery	Harrand & Fuller	24
Old English Inns. By J. R. McGowing	Northern Art Reproduction Co. and H. Shawcross	172
Outdoor Girl, The. By Elwin Neame	Press Etching Co., Ltd.	56
Pen and Ink Booklet Cover, A. By J. R. McGowing ..	Johnston Engraving Co.	128
Pencil Study, A. By the Carlton Studio	The Walker Engraving Co. ..	120
Photo Reproduction of a Newspaper Page..	Half-Tone Engraving Co., Ltd.	128
Portrait, A. By Freckleton & Co.	E. Hamel & Co.	36
Portrait Study, A	V. Siviter Smith & Co.	96
Portrait Study, A. By E. O. Hoppé	Wallage & Gilbett, Ltd.	48
Portrait Study, A. By H. C. Kosel	C. Angerer & Göschl	16
Public Trust Office, The, Wellington, N.Z. By A. A. P. Mackenzie	G. P. Morris..	88
Quiet Hamlet, A	Badoureau & Jones	152
Reproduction from Completed Wash Drawing, showing the result obtained	The Tone Photo-Engraving Co.	172
Robert Kett, "The Tanner," under the Oak of Reformation	Eyre & Spottiswoode..	116
Rural England	The Grout Engraving Co.	56
Sheffield Industries. By Pawson & Brailsford..	Pawson & Brailsford	60
Shepherd, The. By J. E. Tyler	W. F. Sedgwick, Ltd.	108
Sorrow. By Elwin Neame	W. & G. Baird, Ltd.	56
Study in Black and White, A. By F. M. Ramell	Philipson, Son & Skilleter.. ..	68
Thatching. By W. T. Green	The Expert Engraving Co. ..	80
Three Scots. By Thos. Nisbet	Glasgow Engraving Co.	80
Trawling by Night. By A. Bracewell	Gilchrist Bros.	68
"Wanders her Silvery Way." By A. Murray	Vaus & Crampton, Ltd.	104
Wolf, The. By M. E. Lloyd	Half-Tone Engraving Co., Ltd.	128
Ulysses deriding Polyphemus. By J. M. W. Turner, R.A.	Swan Electric Engraving Co., Ld.	56
Up-River Scenes on the Thames. By Reinhold Thiele..	T. B. Browne, Ltd.	60
York Minster. An Impression. By S. G. Kimber, F.R.P.S.	V. Siviter Smith	80
400-h.p. Petrol Marine Engine, A..	Eyre & Spottiswoode, Ltd. ..	168
400-h.p. Petrol Marine Engine, A..	Wallage & Gilbett, Ltd.	160

Illustrations in the Text.

Title.	Engraver.	Page.
"All British." By Thos. Fall	A. E. Dent & Co., Ltd.	149
Apprentice, The. By W. T. Green	Arthur Cox Illustrating Co., Ltd.	189
"Asleep." By Elwin Neame	Acme Tone Engraving Co., Ltd.	60
At Volendam. By W. Gamble	Ashworth & Meredith	124
Barber's Shop, The. By J. P. Glover	Lascelles & Co.	31
Batten Castle, Plymouth. By M. R. Tozer	A. Bourne & Co...	141
Beacon, The. By F. N. Tipton	Half-Tone Engraving Co... ..	119
Bridge of Sighs, Venice. By F. S. Earnshaw..	A1 Engraving Co.	69
Broken Melody, The	W. G. Proverbs, Ltd.	116
Broken Violin, The. By Freckleton & Co.	E. Hamel & Co.	91
Brussels Flower Market. By Godfrey Bingley	Wallage & Gilbett, Ltd.	78
Cameo, A. By E. W. Jackson	Johnston Engraving Co.	33
Childhood's Joys. Freckleton & Co.	E. Hamel & Co	71
Child Study, A. By Gregg, Couper & Co.	Ashworth & Meredith	129
Christmas Cheer. By E. W. Jackson	Hill & Co.	40
Church of St. Clements, The, Cornwall. By M. R. Tozer	Chappelow & Co.	88
Church of St. Paul, Antwerp. By Godfrey Bingley ..	Marshall Engraving Co.	153
City Functionary, A. By W. T. Green	Glasgow Photo-Engraving Co...	63
Coming Storm, The. By F. G. Curzon	E. Hulton & Co., Ltd.	34
Cookhouse, The. By J. P. Glover	The Premier Engraving Co. ..	134
Daddy. By W. T. Green	Marshall Engraving Co.	152
Danseuse, The. By E. E. Hindley	Direct Photo-Engraving Co., Ltd.	77
Decorative Initials. By L.C.C. School of Photo-Engraving	L.C.C. School .. 163, 173, 175, 177, 191, 193	
Dolly. By Freckleton & Co...	E. Hamel & Co.	22
Dry River Valley, The, above Malham Cove, Yorkshire..	Taylor Bros...	190
Example of a Novel Engraving Process	Wilh. Scheel & Co.	184
Fireside Idyll, A. By E. E. Hindley	E. Hulton & Co., Ltd.	105

Title.	Engraver.	Page
Flower Girl, The. By Reinhold Thiele	Emery & Son, Ltd.	185
Fool Engraver, Ye. By A. E. Dent		64
Game of Checkers, A. By J. P. Glover	Photochrom Co.	32
Grimy Thames, The. By J. B. Sablick	Gilchrist Bros.	48
Harbour, The, Volendam. By W. Gamble	Geo. Newnes, Ltd.	111
Harvest Wain, The. By Martin J. Ridley	A1 Engraving Co.	86
Headpiece. By Chas. E. Dawson	Acme Tone Engraving Co., Ltd.	57
Headpiece. By Frank W. Adams	Lascelles & Co.	49
Headpiece. By J. B. Sablick	Gilchrist Bros.	47
Heat of the Day, The. By J. B. Sablick	Arc Engraving Co.	181
Ilfracombe Harbour. By W. P. Thomson	Wallage & Gilbett, Ltd.	114
Initial	Arthur Cox Illustrating Co., Ltd.	100
Initial. By Freckleton & Co.	E. Hamel & Co.	35
Initial. By F. W. Tassell	Philipson, Son & Skilleter	112
Initial. By Gregg, Couper & Co.	Ashworth & Meredith	137
Initial. By Students of L.C.C. School of Photo-Engraving	Students of L.C.C. School of Photo-Engraving	92
Initial Design, An. By Elwin Neame	Geo. Newnes, Ltd.	142
Initial Design. By E. W. Jackson	Vaus & Crampton, Ltd.	65
Initial Design. By Frank W. Adams	T. B. Browne, Ltd.	49
Initial Design (Woodcut)	Glasgow Engraving Co.	23
Initial (Paynetype). By Hood & Co., Ltd.	Hood & Co., Ltd.	81
Interior of a Drawing-Room, Photograph of an	Manchester Wood Eng. Co., Ltd.	199
Lancer, The. By J. P. Glover	Lyth Engraving Co.	30
Life's Twilight. By F. N. Tipton	Arc Engraving Co., Ltd.	121
Little Jap, A. By Gunn & Co.	Entwistle, Thorpe & Co.	87
Live "Teddy," The. By Montagu Redknap	Acme Tone Engraving Co., Ltd.	56
Loading the Net. By F. N. Tipton	Manchester Wood Eng. Co., Ltd.	172
Looe, Cornwall. By W. P. Thomson	The Dean Engraving Co.	86
Malines. By Godfrey Bingley	British Photo-Engraving Co.	25
May Day. By W. Parsons	A. E. Dent & Co., Ltd.	9
Miss Mab Paul. By Reinhold Thiele	Pawson & Brailsford	61
Miss Pamela Hope. By H. Goulton May	London and Provincial Reproduction Co., Ltd.	73
"Murmur of the Shell, The." By Grayston Bird	A. E. Dent & Co., Ltd.	117
Off the Dutch Coast. By S. L. Coulthurst	W. & G. Baird, Ltd.	29
Old Age. By W. T. Green	A. E. Dent & Co., Ltd.	157
Old Door, An, Bruges. By Godfrey Bingley	Hill & Co.	127
Old Sicilians. By S. J. Beckett	Western Mail, Ltd.	108
Old Vagabond, An. By W. T. Green	W. F. Sedgwick, Ltd.	70
"One, Two, Buckle My Shoe." By K. F. Bishop	Photochrom Co.	37
"On Scarboro' Beach" By E. Hulton & Co., Ltd.	E. Hulton & Co., Ltd.	72
On the Alert. By W. T. Green	Geo. Newnes, Ltd.	160
On the Fal, Cornwall. By M. R. Tozer	Glasgow Photo-Engraving Co.	126
"Paddling." By E. Hulton & Co., Ltd.	E. Hulton & Co., Ltd.	89
Palais de Justice, Brussels. By Godfrey Bingley	The Dean Engraving Co.	113
Paynetype Illustrations. By Hood & Co., Ltd	Hood & Co., Ltd.	81 85
Picture Book, The. By E. E. Hindley	Pawson & Brailsford	168
Port Erin. By W. P. Thomson	Hill & Co.	97
Port Erin, Isle of Man. By W. P. Thomson	Western Mail, Ltd	43
Posing Pussy. By Freckleton & Co.	E. Hamel & Co.	133
Preparing for Winter. By J. B. Sablick	Chappelow & Co.	159
Print from a 175-Line Screen		183
Quiet Waters. By S. G. Kimber, F.R.P.S.	Clarke Engraving Co.	41
Reflections. By E. E. Hindley	Arthur Cox Illustrating Co., Ltd.	182
Reviewing the Fleet. By West & Son	H. Rheinlander & Co.	182
"Robbing the Sea." By F. G. Curzon	E. Hulton & Co., Ltd.	94
Rotary Collotpye Machine in Normal Action		180
Run on the Shore, A. By Azuley Wallace & Son	Half-Tone Engraving Co	120
Selfridge Cartoons, The		17, 19
St. Bavon Cathedral, Ghent. By Godfrey Bingley	Chappelow & Co.	104
Study in Line, A. By Carlton Studio	Emery & Son	198
Submarine, A. By West & Sons	T. B. Browne, Ltd.	96
Suggested Title Page. By Frank W. Adams	Lyth Engraving Co.	51
Summer Snapshot, A. By K. F. Bishop	Manchester Wood Eng. Co., Ltd.	109
Sunset, Ilfracombe. By M. Harrand	Harrand & Fuller	158
Tailpiece. By Freckleton & Co.	E. Hamel & Co	152
Tailpiece. By L.C.C. School of Photo-Engraving	L.C.C. School	132
Tailpiece Design. By Ernest W. Jackson	Vaus & Crampton, Ltd.	40
Tailpiece (Paynetype). By Hood & Co., Ltd.	Hood & Co., Ltd.	85

Title.	Engraver.	Page
Tamil Musicians. By S. K. Lawton	"Western Mail," Ltd.	135
Tamil Physician, A. By S. K. Lawton	Arthur Cox Illustrating Co., Ltd.	136
Tintern Abbey. By E. W. Jackson	Arc Engraving Co., Ltd.	53
Toper, The. By the Baxter Studios	Acme Tone Engraving Co., Ltd.	140
Turning Tide, The. By F. A. Williams	Direct Photo-Engraving Co., Ltd.	76
"Velsk," a Borzois. By T. Fall	The Expert Engraving Co.	80
Waiting for Business. By K. F. Bishop	Carl Hentschel, Ltd.	68
"Waiting for the Smacks." By K. F. Bishop	E. Hulton & Co., Ltd.	156
Whitehead, Co. Antrim. By E. Hulton & Co., Ltd.	E. Hulton & Co., Ltd.	139
Wise Engraver, Ye. By A. E. Dent		64

Engravers' Addresses.

Page.

A1 Engraving Co., 5, Tudor Street, E.C. 56, 69, 86
Acme Tone Engraving Co., Ltd., Callow Land Studios, Watford 56, 57, 60, 120, 140
Amalgamated Press, Ltd. (Process Dept.), Lavington Street, Southwark Street, S.E. 148
American Colortype Co., New York, Chicago, and 23-26, Imperial Buildings, Ludgate Circus, London, E.C. 24
Andre & Sleigh, Ltd., Bushey, Herts. 12, 16, 40
Angerer & Göschl, C., 16/1, Ottakringerstrasse 49, Vienna 16, 132
Anglo-Engraving Co., Ltd., 14, Farringdon Avenue, London, E.C. 16, 20
Arc Engraving Co., Ltd., 4 and 6, Farringdon Avenue, E.C. 53, 56, 60, 121, 181
Art Reproduction Co., Ltd., 3 and 4, Plough Court, Fetter Lane, E.C. 60, 104
Ashworth & Meredith, Clarendon Road, Watford 108, 124, 129, 137, 160
Badoureau & Jones, Ltd., Poppin's Court, Fleet Street, E.C 152
Baird, W. & G., Ltd., Royal Avenue, Belfast 29, 56, 168
Blatchford Bros., Palatine Chambers, 6, Market Street, Halifax 128
Bourne & Co., 73, Ludgate Hill, E.C. 36, 108, 141
British Photo-Engraving Co., Vicar Lane, Coventry 25, 88
Browne, T. B., Ltd., 163, Queen Victoria Street, E.C. 40, 49, 60, 96
Cattell, S. A., & Co., 1, Dorset Buildings, Salisbury Square, London, E.C 24
Chappelow & Co., 72-75, Turnmill Street, E.C. 16, 88, 104, 159
Clarke Engraving Co., Ltd., 35, Shoe Lane, E.C. 41
Cox (The Arthur Cox Illustrating Co., Ltd.), 63-64, Ludgate Hill, Birmingham Greeting, 52, 136, 182, 189
"Daily Mirror" Engraving Dept., Whitefriars Street, E.C. 68
Danesi, 36 Via Bagni, Rome 180
Dean Engraving Co., 26, Dean Street, Fetter Lane 86, 88, 113
Dellagana, B., & Co., Ltd., 62 and 62a, Greengate, Salford, Manchester 24
De Reproductie Compagnie, Teilingerstraat 81, Rotterdam, Holland 64
Dent, A. E., & Co., 7, Broadway, Ludgate Hill, E.C. 9, 88, 117, 120, 149, 157
Direct Photo-Engraving Co., Ltd., 38, Farringdon Street, E.C. 76, 77, 80, 120
Electric City Engraving Co., 565-569, Washington Street, Buffalo, N.Y., U.S.A. 60, 96, 168
Electro Tint Engraving Co., 1227-1229, Race Street, Philadelphia, U.S.A. 168
Emery & Son, Ltd., 170-4, Church Road, Hove 96, 185, 198
Entwistle, Thorpe & Co., Woodall's Buildings, 42, Deansgate, Manchester 60, 87, 136, 160, 164
Expert Engraving Co., 119, Fleet Street, E.C. 80
Eyre & Spottiswoode, Ltd., New Street Hill, Shoe Lane, E.C. 116, 168
Furnells, J., Cortes 492, Barcelona, Spain 68
Gatchell & Manning, 27-41, South Sixth Street, Philadelphia, U.S.A 188
Gilchrist Bros., Queen's Place, Claypit Lane, Leeds 47, 48, 68, 72, 152
Glasgow Photo-Engraving Co., 30, John Street, Glasgow 23, 60, 63, 80, 126
Globe Engraving and Electrotype Co., 407, 425, Dearborn Street, Chicago 172
Grout Engraving Co., 68, Old Bailey, E.C. 16, 56, 112
Half-Tone Engraving Co., Ltd., 16, 20 and 25, Farringdon Avenue, London, E.C. 24, 56, 119, 120, 128
Hamel, E., & Co., Palmerston Street, Woodborough Road, Nottingham 22, 35, 36, 71, 91, 120, 133, 144, 152
Harrand & Fuller, Eden Grove, Holloway, N. 16, 24, 158
Haygarth, F. M., "Natal Mercury," Durban, Natal 68
"Helios," Binnenrotte 113, Rotterdam 36
Hentschel, Carl Ltd., 182-184, Fleet Street, E.C. 36, 68, 88
Hill & Co., 41-42, Shoe Lane, E.C. 40, 60, 97, 127
Hood & Co., Ltd., St. Bride Works, Middlesbrough 81-85
Hulton, E., & Co., Ltd., Fleet Street, E.C., and Withy Grove, Manchester 34, 72, 89, 94, 105, 139, 156
Inkersell, J. T., Government Printing Office, Wellington, N.Z. 76

Page.

INTAGLIO PATENTS, LTD., 124, Southwark St., and at 90, Upper Ground St., S.E. Frontispiece
JOHNSTON ENGRAVING CO., THE, 41, Snow Hill, E.C. 33, 128
KLEBOE & FRANKLIN, 75, Fleet Street, London.. 120
LASCELLES & CO., LTD., Maybury Studios, Maybury Road, Willesden 31, 36, 49
L.C.C. SCHOOL OF PHOTO-ENGRAVING AND LITHOGRAPHY, 6, Bolt Court, E.C 92, 132, 163, 173, 175, 177, 191, 193
LONDON AND PROVINCIAL CO., LTD., Thornton Road, Bradford 73, 116, 160
LONDON ETCHING COMPANY, 3, Holborn Place, High Holborn, W.C. 196
LYTH ENGRAVING CO., 281, Deansgate, Manchester 30, 51, 68
MANCHESTER WOOD ENGRAVING CO., LTD., 78, King Street, Manchester 109, 172, 199
MARSHALL ENGRAVING CO., 78, Fleet Street, E.C. 152, 153, 184
MORRIS, G. P., Govt. Printing Office, Wellington, N.Z. 88
NEWNES, GEO., LTD., Process Department, Conduit Court, Long Acre, W.C. 111, 142, 169, 172
NORTHERN ART REPRODUCTION CO., LTD., 47, Thomas Street, Liverpool 172
PAWSON & BRAILSFORD, Mulberry Street, Sheffield 60, 61, 168
PEMSEL & LEMBKE, 78, Turnmill Street, London, E.C. 200
PHILIPSON, SON & SKILLETER, 148, Westgate Road, Newcastle-upon-Tyne .. 68, 112, 152
PHOTOCHROM CO., LTD , 35-39, Hosier Lane, E C 32, 37, 56
POLYTECHNIC SCHOOL OF PHOTOGRAPHY AND TYPOGRAPHY, 307, Regent Street, W. 160
PREMIER ENGRAVING CO., LTD., 57, Shoe Lane, E.C. 80, 134
PRESS ETCHING CO., LTD., 12, Wine Office Court, Fleet Street, E.C. 56, 156
PROVERBS, W. G., LTD., 19, Newhall Street, Birmingham 116
RHEINBERG & CO., 32, Snow Hill, E.C. 176
RHEINLANDER, H., & CO., 2, Sandland Street, Bedford Place, Holborn, W.C. 108, 182
SCHEEL (Wilh. Scheel & Co.), Akersgaden 7, Christiania 183, 184
SCHELTER, J. G., & GIESECKE, Leipzig 8
SEDGWICK, W. F., LTD., 237, Blackfriars Road, E.C. 56, 70, 108
SHAWCROSS, H , Water Engineer's Office, Municipal Offices, Dale Street, Liverpool . .. 172
SMITH (V. Siviter Smith & Co.), 47, Great Charles Street, Birmingham 80, 96
STAFFORD & CO., LTD., Netherfield, Nottingham 104
STRAND ENGRAVING CO., LTD., Martlett Court, Bow Street, London, W.C. 48, 56
SWAIN, JOHN, & SON, LTD., 58, Farringdon Street, London, E.C. 32
SWAN ELECTRIC ENGRAVING CO., LTD., 116, Charing Cross Road, W.C. 56, 72
TAYLOR BROS., Sovereign Street, Leeds 108, 190
TONE-PHOTO ENGRAVING CO., THE, Lionel Street, Birmingham.. .. .. 88, 172
VAUS & CRAMPTON, LTD., 31-32, Kirby Street, Hatton Garden, E.C. 46, 65, 68, 104
WALKER ENGRAVING CO., Lexington Buildings, 141-155, East 25th Street, New York 120
WALLAGE & GILBETT, Crown Buildings, James Watt Street, B'ham... 48, 78, 144, 152, 160, 168
WATFORD ENGRAVING CO., Loates Lane, Watford, Herts. 40
"WESTERN MAIL," LTD., Cardiff 43, 68, 108, 135
"WESTERN MORNING NEWS," Process Dept., 31, George Street, Plymouth 80
ZACHER, C. P., & CO., 221, Fifth Avenue, Chicago 160
ZANDERS, J. W., Bergisch-Gladbach, Rhenish, Prussia .. .. Advts. xvi.
ZEESE WILKINSON CO., 213, E. 24th St., New York- 40, 48

Photographers, Artists and Publishers.

ADAMS, FRANK W., Baskerville Press, Eastbourne 49, 51, 88
ALLERSTON, A., Pietermaritzburg 68
ANTONIADI, E. M. 172
BAXTER STUDIO, 27, Chancery Lane, E.C. 116, 120, 140
BECKETT, S. J., F.R.P.S., 20, Baker Street, Portland Square, W. 108
BINGLEY, GODFREY, Thornichurst, Headingley, Leeds.. .. .. .. 25, 50, 78, 104, 113, 127, 153
BIRD, GRAYSTONE, 38, Milsom Street, Bath 117
BISHOP, K. F., 10, Warburton Street, Stockton Heath, Warrington 37, 68, 109, 156
BOILEAU, PHILIP 24
BRACEWELL, MR AND MRS. ALFRED, 30, Heaton Grove, Bradford 68
BRITTAIN, C. E. 16
CARLTON STUDIO, 195, Strand, W.C. 112, 120, 144, 198
CONNAH, H. H., 20, Rue de la Victoire, Paris.. 68
COULTHURST, S. L , The Poplars, Broadoak Road, Wortley, Manchester 29
CUBITT, MISS E. A... 48
CURZON, F. G., Monton, Manchester 34, 94
DAWSON, CHAS. E., Thanet House, Strand, W.C., also Naphill, Bucks 57, 60
DOVER STREET STUDIOS, 38, Dover Street, Mayfair, W. 88
DOWNER, FREDK., & SONS, 110, High Street, Watford 40

Page.
EARNSHAW, F. S., Handforth, near Manchester 69
ELLIS, ALFRED, & WALERY, 51, Upper Baker Street, N.W. 24, 36, 40, 108
FALL, T, 9, Baker Street, W. 80, 149
FLETCHER, HANSLIP 24
FOULSHAM & BANFIELD, 49, Old Bond Street, W. 80
FRECKLETON & Co., Photographers, Nottingham 22, 35, 36, 71, 91, 133, 152
GAMBLE, W., 109, Farringdon Road, E.C. 111, 124
GARSIDE, J. T., Heywood Terrace, Greetland, near Halifax 128
GILLIARD, WALTER, 59, Freemantle Road, Eastville, Bristol 172
GLOVER, JOHN P., Lorne Villa, Bradford-on-Avon 30, 31, 32, 134
GRAINGER, HAROLD G., 41, Brudenell Grove, Hyde Park, Leeds 36
GRANVILLE STUDIO, Gray's Inn Chambers, 20, High Holborn, W.C. .. .. .. Title Page
GREEN, W. T., 27, Upper High Street, Winchester 63, 70, 80, 152, 157, 169, 189
GREGG, COUPER & Co., Parade Studios, Watford 129, 137
GREGER, CARL, Craig-y-Don, Victoria Drive, Leigh-on-Sea 104
GUNN & Co., Richmond 87
HAINES, R., London 52
HARRAND, M., Eden Grove, Holloway, N. 16, 158
HILLINGFORD, ROBERT A. 16
HINDLEY, E. E., 86, Talbot Road, Blackpool 77, 105, 168, 182
HOOK, J. C. 16
HOPPÉ, E. O., F.R.P.S., 8, Margravine Gardens, Baron's Court, W. Frontispiece, 48, 88, 108
JACKSON, ERNEST W., Nettlestone, Hale, Altrincham 33, 40, 46, 53, 65
KIMBER, S. G., F.R.P.S., Oakdene, Highfield, Southampton 41, 80
KINGSTON, JAS. A., Esq. 108
KIRK, M. L. 48
KOSEL, H. C., Vienna 16
LANGFIER, LTD., 23A, Old Bond Street, W. 108
LAWTON, S. K., Photo Works, Manippay, Jaffna, Ceylon 135, 136
LEWIS, A. I., Hunter Hill, Intake, near Sheffield 88
LLOYD, Miss M. E., 31, Falkner Street, Liverpool 128
MACKENZIE, A. A. P., New Zealand 88
MARTIN, J. L. 76
MAY, H. GOULTON, Photographer, 72, Selwyn Avenue, Kew Road, Richmond 73
MCGOWING, J. R., 20, Tremadoc Road, Clapham, S.W. 128, 172
MCKINLAY, A. G., "Liverpool Daily Post" Office, Liverpool 172
MIDDENDORP, G. 36
MURRAY, A., Rumbling Bridge, N.B. 104
NAMIAS, PROF. RODOLFO, Via Settembrini 36, Milan, Italy 128
NEAME, ELWIN, 4, Onslow Place, South Kensington, S.W. 56, 60, 142
NISBET, THOMAS, Glasgow Photo-Engraving Co., 30, John Street, Glasgow 80
PARSONS, W., 147, North End, Croydon 9
RAMELL, F. M., Sittingbourne 68
REDKNAP MONTAGU, 6, Ash Villas, West Norwood 56
RUSS, ROBERT 132
RICHON, MONS. J. 160
RIDLEY, MARTIN J., Photographer, Boscombe, Bournemouth 86
SABLICK, J. B. 47, 48, 60, 159, 181
SCHMITTMANN, DR., Düsseldorf 8
TASSELL, F. W., Carlisle 112
THIELE, REINHOLD, 66, Chancery Lane, W.C. 24, 36, 60, 61, 68, 185
THOMSON, W. P., 15, Wellington Road, Whalley Range, Manchester 43, 86, 97, 144
TIPTON, F. N., 4, Harrowdene Road, Knowle, Bristol 119, 121, 172
TOZER, M. R., 360, Wells Road, Bristol 88, 126, 141
TYLER, JAMES E., North Street, Halstead, Essex 108
USHER, LANCELOT 36
VALENTINE & SONS, LTD., Perth Road, Dundee 32
WALLACE, AZULEY, & SON, Sidmouth 120
WELCH, R., Photographer, 49, Lonsdale Street, Belfast 68
WEST & SONS, Palmerston Road, Southsea 72, 96, 182
WILLIAMS, FRED A., Oak Terrace, Padstow 76
ZANEN, W. VAN 36

Punta della sfinge near Portofino, Riviera Levante

Taken with

ZEISS-Tessar 1:4.5, *f*=150 mm

The Year's Progress in Process Work.

By THE EDITOR.

MAY DAY.

A. E. DENT & Co., LTD. Photograph by W. PARSONS.

THE tendency of all processes of graphic representation seems to be that they reach the zenith of perfection and then decay, giving place as a rule to some newer method which appears to better meet the exigencies of the times.

We have seen this fact exemplified in copper and steel plate engraving, in wood engraving, and in lithography, each of which in its turn has had its vogue or fashion. In each case we have had masters in their respective crafts, but as they have died their mantle has not fallen on other shoulders, nor have others even essayed to tread in their footsteps.

The reason is not far to seek. As a process becomes popularized, or as our French neighbours say "vulgarized," the number of really skilful and experienced workers is not equal to the increased demand; inexperienced men are pushed forward, and not possessing the skill to render them independent against the tendency of the buyer to lower their rate of remuneration they work for less and less until reduced to starvation pay.

Can it be wondered at that processes have deteriorated and decayed, until a new method has captivated the public, and given the death blow to the older one? Is history going to repeat itself in the case of half-tone, three-colour, collotype and photogravure? Truly it would seem so.

We should be the last to take a pessimistic view of the situation (indeed the evidence of the subsequent pages of this Annual forbids it), yet we cannot but view with alarm the present state of these beautiful processes. They have, indeed, reached the zenith of their perfection, and it hardly seems possible to conceive a way in which they can be materially improved; except in more skilful execution. But along with this attainment there has grown up through excessive competition, and through the mad race for speed and output, a most unhealthy state of the business. The work barely yields a living to those who are engaged in it, and matters become daily worse and worse. So it will go on, we fear, the quality of work deteriorating to a dead level of commercial mediocrity until from the customer's point of view all are alike, only differing in the price charged for their work.

Then the time will be ripe for a new process, the accomplishments of which will be so much superior that the public will be captivated, and will desert the old love for the new.

The Processes of the Future.

We have not far to look for the direction from which the new processes will come. In our opinion the processes of the immediate future will be rotary intaglio and offset litho, or a combination of both, with the chances greatly in favour of the last-mentioned process.

On what, it may be asked, do we base our opinion ? Simply this, that the most costly and time-consuming part of the photo-engraving process of to-day is the etching of the plates to a sufficient depth for typographic printing, and, further, it is in the etching, and in working the earlier stages of the process to suit etching methods, that the greatest loss of tone and detail occurs. Then again, the blocks have to be printed with the greatest care, at a comparatively low speed, on the best of papers, and with the finest inks, in order to obtain proper results.

Consider, then, what is the case with the offset method in comparison with the foregoing. A simpler negative, an easier print, no deep etching, no make-ready for printing, ordinary papers, ordinary inks, and high speed of running, coupled also with the advantage of unlimited duplicating of the design on the plate.

There is another advantage which must not be overlooked, *viz.*, the ability to work " high light " half-tone methods with perfectly softened edges, through there being no dip of the rollers. Still more, there is for colour work the facility of working solids and tints and of adopting the multifarious little artifices at the command of the lithographic printer for improving the result in printing. There is, again, none of the " squashing " effect of colour forced to the edges of the half-tone dots as in the case of typographic printing. The tone is practically continuous in lithography, and there is no offensive " pattern " caused by the crossing of screen systems.

Thus there is everything to favour lithographic printing, but the ultimate and complete success of offset lithography can only be through the aid of photographic processes for laying down the work on the plate. If the trade clings to its old-fashioned methods of direct drawing and transferring the improvement will be but slight. What may probably happen is that photo-process firms will take up and develop the offset press for graphic reproduction, leaving the regular lithographer to work commercial jobs. The process man will be wise if he sees and grasps this opening, for certainly offset printing is a power to be reckoned with in the near future.

Intaglio Lithography.

We mentioned above the possibility of a combination of rotary lithography and rotary photogravure. The delicate work yielded by an engraved stone is well known, as also the difficulty of printing it. Is it not possible that a set-off from a shallow engraved intaglio plate may solve the difficulty, and yield the soft juicy line and velvety tone which we associate with copperplate etching and photogravure ? We have seen results by ordinary flat bed litho printing before the offset method came into vogue, which seem to confirm this supposition. It is quite easy to make such plates and the printing presents no difficulties ; indeed, the one drawback to the process which was present in flat bed printing —that of the powerful impression required—is quite absent in the rotary method

of printing. No doubt intaglio photogravure will hold the field for some time to come, but its successor will undoubtedly be rotary lithogravure, if we may coin a name for it.

Wet Colour Printing.

Concurrent with this development of offset printing there is another method being now developed in America which is likely to have an important bearing on the future of colour printing. It has been given the inartistic though expressive name of "wet colour printing." Some admirable examples of this work have been issued from the offices of *The Ladies' Home Journal*, Philadelphia, where the "wet press" is installed. Four colours are put on immediately, one after the other, before any preceding colour is dry, the machine being of the rotary type and running at a high rate of speed. The colouring is very artistic and ranges from solids to the most delicate tints. The blocks are a combination of half-tone and hand work. The covers of the *Saturday Evening Post* are also printed in two colours by the same method, and the enormous circulation of this well-known journal makes it at once evident that the process and the machinery are perfectly practical. When such a result can be obtained from blocks it is easy to imagine that similar methods will be applied to lithography through the medium of offset printing.

Offset Printing in Colours.

The inset we give in another part of this volume, "A Spanish Beauty," will be studied with interest by all who are concerned in colour printing, and especially lithographic colour printing. It has been printed in five colours on Mann's Offset machine, and furnishes convincing evidence of the applicability of this method to colour printing. Further, it is noteworthy as being the first important example, we believe, of multi-colour printing produced in this country on the offset rotary. We are assured by the printers, Messrs. W. W. Sprague and Co., that the work presented no special difficulty; indeed, there was no time for experimenting, had such been necessary, as the inset was reproduced, printed and delivered to us all in the month of November. The picture has been reproduced from a water-colour original by Messrs. Pemsel and Lembke by a special process which they have been perfecting during the last six months. Although only five colours have been used the effect to the ordinary eye is that of the usual ten or twelve-colour chromo-lithograph. The range of colour is considerable and the depth is well maintained. The artists claim that by their process any ordinary picture can be faithfully reproduced in about half the usual number of workings. The picture was transferred from the original surface on to Penrose Litho-Aluminium plates for working four-up. The machine used was a single colour rotary, the colours being separately worked, but Messrs. Mann's two and three-colour rotary machines are being rapidly developed, and it is not improbable that before another volume of this Annual is published rapid multi-colour offset printing will be an everyday matter.

We would also call attention to another example of offset printing in another part of this book, done on the Harris offset press. It is a transfer from a steel plate engraving, kindly lent us for the purpose by Messrs. McQueen Bros., the well-known plate printers, and we think it will be admitted that it retains all the delicacy of line of the original engraving, although printed on rough paper.

Machine Photogravure.

Our frontispiece is an example of a new process of machine photogravure printed direct from hardened steel plates by the special process of Intaglio Patents,

Limited. The feature of this process is that the printing is done from a flat plate, and the inking and wiping is automatic. The plate is capable of yielding a very large edition with absolute uniformity of result from beginning to end of the run, and either smooth or rough paper can be used. In fact the printing is equally as successful on thick cover paper as on tissue. The producers of this frontispiece are to be congratulated on the artistic result they have attained, and upon the absence of any perceptible mechanical grain.

Rotary Photogravure.

Great progress has been made in this process of intaglio printing during the past year. The Rembrandt Intaglio Co., whilst continuing to maintain the high standard of excellence for their monochrome work, are developing very successfully their process of colour printing to which we referred last year. An American firm, the Vandyck Gravure Co., working along similar lines, we believe, have also produced some admirable results in colour, and are quite successful in their monochrome results. We have also seen examples of monochrome work by two other American firms, which are obviously printed by a similar method. On the Continent there are at least four firms operating some process of rotary intaglio printing, and a number of examples were shown at a recent Dresden exhibition. In England there is evidence of several experimenters being actively at work to solve the problems of this process, and some of them have apparently come very near to attaining the desired results, judging from the specimens we have seen. We could have had specimens for this volume from at least two firms had we gone to press a little later, but as we did not care to delay publication beyond the usual time we have preferred to allow these offers to stand over for another year, although the proofs we saw were quite worthy of a place in our Annual. Among those who have achieved success in this process after long and patient experimenting we are at liberty to mention Mr. Landeker, who is well known in the art publishing trade. It seems likely, therefore, that the monopoly so long enjoyed by a well-known firm in this beautiful method of printing has passed away from them, though without the secret of their particular method being revealed. The history of this process is a striking exemplification that no process, however carefully guarded, can be considered impossible of being successfully imitated. To our knowledge an immense amount of money has been expended by those who have succeeded in discovering how the method is worked, and it is not likely that they will make public the experience they have gained at such cost to themselves, so that it is hardly probable that the process will become common property, and thereby its results cheapened by extreme competition as has been the case with collotype, half-tone and three-colour.

Collotype.

The continued decadence of this process is a matter for regret, but its workers have only themselves to blame for lowering the price to a point at which it has been impossible to produce good work. The effect of this has been that the best work has passed to Continental firms, and so far as England is concerned the process may be regarded as practically dead. We believe we are correct in saying that of the three or four firms who are doing collotype printing in this country to-day not one could exist if they were dependent on collotype printing alone. The only hopeful fact we have to record in connection with this process is the introduction of a new machine on the rotary principle by the firm of Danesi in Rome, and to which we refer elsewhere in this volume. The example we

Silvia.

Andre & Sleigh, Ltd.

Example of new "Screenless" process.

present, showing the capabilities of this machine for three-colour printing, is a decided mark of progress. We understand, however, that it is not intended, for the present at any rate, to put this machine on the market.

Three and Four-Colour Printing.

If we are asked to say whether any notable advance has been made in these processes during the past year, we are bound to answer that so far as the method of production is concerned no change is to be recorded. No new discovery has been made, nor any striking improvement in the manner of operating the process. But as regards the quality of work and the greater ease and certainty of producing the best results much has been done. Those who are working the process have become much more skilful in its operation, and there are very few process firms to-day who are unable to turn out a passable result with reasonable promptitude, whilst those who are able to produce work of the highest excellence are much more numerous than heretofore. The fact that many artistic books are now being entirely illustrated by the three-colour process, and that these books fetch a high price is the best proof that the process is now run on a thoroughly good commercial footing, so far as the ability to turn out the work is concerned, but it is extremely regrettable to hear the complaints of the trade as to the miserably low price at which the work has to be done. It is pitiful that a process of such infinite beauty and with such marvellous possibilities has been allowed to become degraded by cut-price competition to a point where its workers will no longer have the time, even if they had the heart, to impart to it a truly artistic merit. The effect must inevitably be to bring the process down to a dead level of mechanical mediocrity. The customers will only have themselves to blame if they find an increasing difficulty in obtaining really good work, whilst the process firms are beginning to find that a process which might have been of inestimable benefit to them, and a means of elevating their industry, is rapidly becoming a positive burden through their being forced by the exigencies of competition to do work (needing expensive plant, costly floor space, highly skilled labour, and dear materials) which brings them in a less return than ordinary half-tone, and in many cases probably no profit at all. No process can advance under such conditions, and the prospect of any material improvement seems very remote.

The Half-Tone Process.

There has been a complete lull in this process during the past year. We have no new process to record if we except Paynetype, which does not claim an improvement of quality, but only a greater ease and quickness. No new screens have been put on the market, and those which have been put forth two or three years previously have not come into any regular use. It would seem as though the half-tone worker said, " We have no time for seeking to improve ; it takes us all our time to get the work out, and to make a living at the present terribly low prices." The cry seems to be, " Rush, rush, rush ! Quicker, quicker, quicker ! Cheaper, cheaper, cheaper ! " The office boy is always waiting on the doorstep for the work. The traveller soliciting orders is ever being met with fresh demands to cut the price still further, and the customer chortles to himself that he can get the work done at any price he likes to offer. From the workman's point of view it is a terrible situation; the high-priced skilled men are being constantly forced out, and their places are taken by inexperienced youths. Cheaper materials and cheaper methods have to be employed. What the end will be it seems impossible to foretell. Let us hope, however, that it will lead to the establishment

of some few firms who will have the courage to do good work and demand their price for it. When the customer finds that he can only get a certain average of work at the price he is paying he will probably come round to the conviction that after all " the dearest is the best."

Machine Etching.

It is a singular fact that the great development of machine etching, which has been more marked than ever during the past year, whilst leading to much greater output, owing to its speed, has really raised the quality of the work. The experience of firms who are using the Levy Acid Blast machine on the finest line and half-tone work has abundantly shown that the reproduction is more perfect even with less handwork, and the blocks produced are of a superior printing quality. Copper etching with the acid blast has only just begun to be appreciated in this country, though in America its success has been much longer demonstrated. It is found that the tones are much better held by the machine etching, and much less fine etching has to be done if a negative and print is made suitable for the machine. We have seen prints of the finest retouched catalogue illustrations put into the machine in large " flats " and etched in about four minutes so perfectly that no further work was needed on the plates, whilst the work below the surface was of much greater depth and smoothness than could possibly have been obtained in a much longer time by the old hand methods. The Levy machines are making great progress in America, in our own country, and on the Continent of Europe. Undoubtedly their use will soon extend to more remote parts of the world, once the news of their success is spread. Mr. Louis Edward Levy, the inventor of this epoch-making machine, and also of the ingenious powdering machine, which is its companion, certainly deserves the success he has now attained as a result of his long and patient labours, extending now for about fourteen years, in perfecting this wonderful example of labour-saving mechanism. Those competitors who have endeavoured to rob him of the results of his patient endeavours are, fortunately for him, finding their crude devices relegated to the scrap heap.

Screenless Processes.

The past year has, to our mind, witnessed a decided advance in the direction of what may be termed " Screenless Processes," by which may be understood any process of dispensing with the mechanically ruled cross lined screen. It does not follow thereby that a screen may not be used for the blocks, as they may be produced by means of a grained screen, such as the Metzograph. We would define a " screenless process " as any method of producing half-tone blocks in which there is no mechanical pattern.

Last year we gave an example of a grained process worked by the Acme Tone Engraving Company, and this firm have made great progress with their method judging by the further examples we have seen, these comprising landscapes, portraits and architectural views.

Mr. Walter Hay, some of whose results we gave last year, has still further improved on his process, and has done some admirable work in an experimental way by the simplest means. He uses a special form of screen and obtains a wonderful amount of detail and full range of tone gradation whilst preserving delicacy and softness. One of his latest results is a five-colour portrait, which possesses excellent qualities. We understand that he is desirous of finding some process firm who will take up his method and apply it commercially, and we shall be pleased to give his address to any firm interested.

The " last word " up-to-date in " Screenless processes " is the work of Messrs. Andre & Sleigh, whose admirable examples in monochrome, duotype, and three-colour are given in this issue, and we commend them to the careful attention of our readers. The ability to apply this process to three-colour work is certainly an achievement, as anyone who is acquainted with the difficulties of applying grain process to three-colour work can readily understand.

In connection with these grained processes we would also direct our readers' attention to the portrait of Fritz Thaulow by the firm of Wilh. Scheel & Co., and which is referred to in greater detail in an article elsewhere in this volume.

The Metzograph Screen.

It is pleasing to note that the long and laborious efforts of Mr. James Wheeler to popularize this screen are at last being rewarded with the success he deserves. The direction in which the greatest progress is being made is in lithography, and from several quarters we have heard enthusiastic expressions concerning the results which have been obtained, particularly by American and Continental firms. Mr. A. C. Austin, of New York, writes us concerning the admirable results obtained on quite a large scale by the American Lithographic Co., and speaks of large size portraits reproduced with the Metzograph screen in a manner which rivals the delicacy of the finest hand-drawn crayon work on stone. Mr. R. B. Fishenden, of the Manchester Technical School, has also done some excellent work in showing the possibility of using the Metzograph screen in the printing frame, exposing through a continuous tone negative. He has drawn up some careful instructions for the process which will shortly be published for the benefit of all who desire to work it. We look forward with confidence to a considerable development of this application of the Metzograph screen.

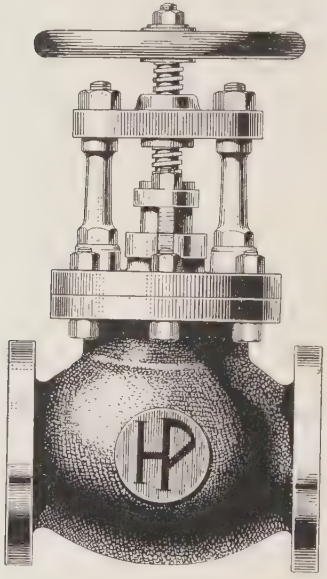
Progress in Electrotyping.

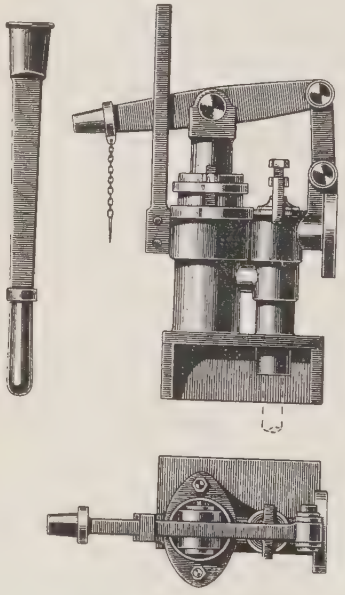
Elsewhere we give examples of electrotyped half-tones made in America by a new process of liquid blackleading, which, as we have shown in the article on the subject, is capable of yielding perfect results, even when one electro is made from another in succession up to a series of ten or twelve. We are, however, able to show another set made nearer home, by the Albert Galvano process of moulding in sheet lead as worked in the foundry of Messrs. Eyre & Spottiswoode, who have made considerable improvements in the process since they first installed it. The examples show that after an electro has been taken from the original it is possible to make a duplicate from the electro, and from this duplicate another electro, and we think our readers will admit that there is little, if anything, to choose between the original and duplicates. The original is made with 133-line screen from an old print, and it will be seen that the delicacy and detail of the picture has been well retained. Electros were made in the ordinary course of business without any preliminary trials. The fact that the accuracy of size is maintained throughout the series is evidenced by the metallic overlays for the four blocks having been made from the original half-tone. As a proof of the genuineness of the process, Mr. Corey, the manager of Messrs. Spottiswoode's foundry offers that we bring to him a block and wait until it is moulded, then taking it away ; afterwards the electro to be moulded and also taken away ; and so with the third electro. There is no reason why it should not be possible to go on duplicating the electros indefinitely. We have also seen a sheet of three-colour work printed six-up, consisting of five sets of electros made from the three-colour original and all printed together in perfect register. There seems to be

no reason why large sheets of colour work should not be printed from electro duplicates, and this, of course, will enhance the commercial value of the three-colour process for the printing of large editions.

A Revival of Pen and Ink Drawing.

There is a distinct tendency at the present time towards a revival of pen and ink drawing for reproduction by the line zinc etching process, and an example of this tendency is brought before us by Mr. J. McGowing, a clever pen and ink artist, who has done some most artistic line drawings of landscapes, architecture and interiors. One of his drawings is reproduced in this issue by the Amphitype process, and last year we gave a photo-litho by the same process from one of his sketches showing the interior of an old oak room. Mr. McGowing now presents to us a distinct departure from his previous style of work. The blocks we show on this





page are reproduced from two of his pen and ink drawings done for the purpose of illustrating an engineer's catalogue. The reduction is about quarter size, and the aim is to give something of the effect of the old-fashioned wood engraving. How far Mr. McGowing has been successful we leave our readers to judge. It is certainly neat and precise work, and we understand that this style of execution has been preferred for some engineer's catalogues. The blocks are further interesting from the fact that the reproductions were made direct on the zinc without any intervening negative by the Paynetype process, by Mr. Arthur Payne, and were etched on the Levy Acid Blast Etching Machine in the office of the *Newcastle Chronicle.*

The Stream.

J. C. Hook.

Andre & Sleigh, Ltd.

Example of new "Screenless" process.

Chappelow & Co.

From a painting by Robert A. Hillingford.

Henry IV. of France and his Children.

Reproduced from "The Art Journal" by permission of Messrs. Virtue & Co.

Harrand & Fuller. *Photograph by M. Harrand.*

High Tor, Matlock.

The Grout Engraving Co.

Ebb-Tide.

C. Angerer & Göschl. *Photograph by H. C. Kosel.*

A Portrait Study.

WINTER ON EXMOOR.
(from the Dulverton Edition of Lorna Doone.)

4 Colour blocks by :-
The Anglo Engraving Co., Ltd.
14 Farringdon Avenue,
LONDON. E.C.

By kind permission
of the publishers :-
Messrs Sampson Low, Marston & Co. Ltd

Line Drawings for Newspaper Advertisements: The Selfridge Cartoons.

By CHAS. E. DAWSON.

FROM the view-point of the man concerned with pictorial publicity there can be no question that among the events of 1909 must be reckoned the outbreak of whole-page cartoons that announced the opening of Selfridge's.

All records were broken by the magnitude and taste of these designs. Drawings by some of the most representative and distinguished black-and-white artists of Europe filled whole pages in the leading daily journals of London for a week, among them Walter Crane, Eugene Grasset, Linley Sambourne, Anning Bell, Bernard Partridge, E. J. Sullivan, Lewis Baumer and Fred Pegram.

WE HAVE EVERY PLEASURE IN ANNOUNCING THAT THE FORMAL OPENING OF OUR PREMISES–LONDON'S NEWEST SHOPPING CENTRE–BEGINS TO-DAY AND CONTINUES THROUGHOUT THE WEEK
WE WISH IT TO BE CLEARLY UNDERSTOOD THAT OUR INVITATION IS TO THE WHOLE BRITISH PUBLIC AND TO VISITORS FROM OVERSEAS–THAT NO CARDS OF ADMISSION ARE REQUIRED–THAT ALL ARE WELCOME–AND THAT THE PLEASURES OF SHOPPING AS WELL AS THOSE OF SIGHT-SEEING BEGIN FROM THE OPENING HOUR.
SELFRIDGE & CO.
OXFORD STREET LONDON W

A Herald of the Opening Day, by Bernard Partridge.

A quiet consideration of these drawings, comparing the variety and effectiveness of the different styles employed, emphasises the vitality of pure line-work—I might say almost its eternal quality.

Tone processes and stipples may come and go, but line endures for ever. It was the first method of graphic art since the prehistoric drawings scratched on stone and reindeer horn, and it will doubtless survive all other mediums. When we are through with the wash drawings that imitate photographs, and the photographs that

imitate paintings, we shall return to line work as the *ultima thule* of art.

There is, too, that quality in the engraved or drawn line which harmonizes with the varied linear quality of type, and dominates the old bookmaking. A half-tone illustration can only be a compromise; its greater range of tone values offers a more slavish imitation of nature and is often exploited at the expense of the idea which should underlie it. The more slavishly we imitate nature, the further we get from the domain of art and thought. Therein lies the doom of all "natural colour," and "facsim." processes, because from their very qualities they must fail wherever they fall short of actually rendering things in their full form and colour. The shortcoming will be all the more apparent by reason of the great proportion of accomplishment.

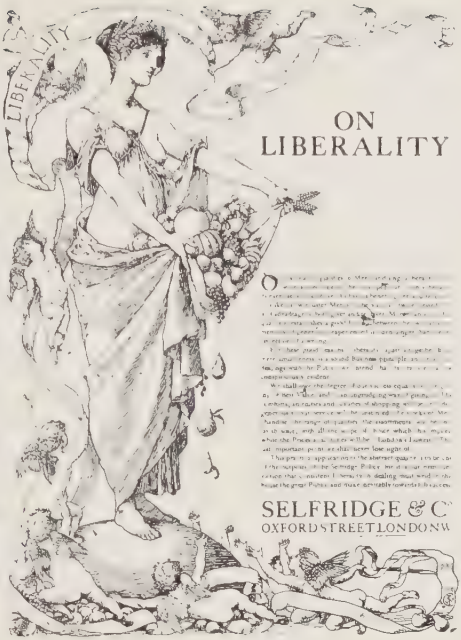
The cleverest process workers aim to reproduce so perfectly in "natural colours" that nothing is left to the imagination, nothing for the mental vision to complete, and although I do not want to disparage their brilliant achievements, or under-rate the utility of the numerous amazing "facsim" methods for the sake of emphasizing a point in favour of line work, yet the value of the latter is apt to be overlooked in the dazzling brightness of superficially attractive tone and colour. The lesson of the Selfridge series is chiefly the triumph of line as a medium for conveying ideas with impressive dignity and truth. It is even greater than the written word, but when accompanied by appropriate and well-considered letterpress, it stands supreme. Among the cartoons, we find many styles—pen drawings enforced by heavy masses of solid black, floated on with a full brush, designs drawn with reed-pen and brush, such as S. E. Scott's "From the Markets of the World," and an all-chalk drawing by John Mills. It is notable that only one out of the cartoons bears a trace of mechanical stipple, and that is a drawing by a fashion artist. Some of the designs have little patches of pen stipple and splatter work applied by the artist, but the most powerful and successful of the series, including those drawn by the older men, depend solely upon the force of pure line work unalloyed by adventitious aids of any kind.

Some advertising men have criticised these cartoons for not conforming to their ideas of "selling force," but the chief motive of the drawings was their "announcing force," to make known the opening of the business and to establish a prestige. Most of the big retail stores in London have been gradually built up from small beginnings, and by the sheer force of antiquity have mellowed like wine with a fine old crusted flavour, not to say a "grand manner." Mr. Selfridge, who opened his big store ready-made and full-sized had to create his prestige, and it was to give the public a notion of the style, manner and methods of the business that should characterize the house, that these cartoons were designed. They not only established in a week the prestige and dignity that it had taken older firms years to evolve, but also prepared the way for the more direct "selling force" of his subsequent advertisements.

Mr. Bernard Partridge's splendid herald (reminiscent of Dürer in its superb quality of line) was the keynote of the first six designs that opened the pictorial attack on London. Mr. Partridge is, of course, a member of the famous staff of "Punch," and some years ago divided his activities between the boards of the theatre and the drawing boards. As an actor, under the stage name of Bernard Gould, he played in the first Bernard Shaw production in London, for which, by the way, the late Aubrey Beardsley designed his first and best-known poster. The play was at the Avenue Theatre, and Beardsley's art, blazing out upon London for the first time, provoked such a torrent of hostile criticism that the whimsical "Mr. Punch" advised the management to "'ave a new poster!"

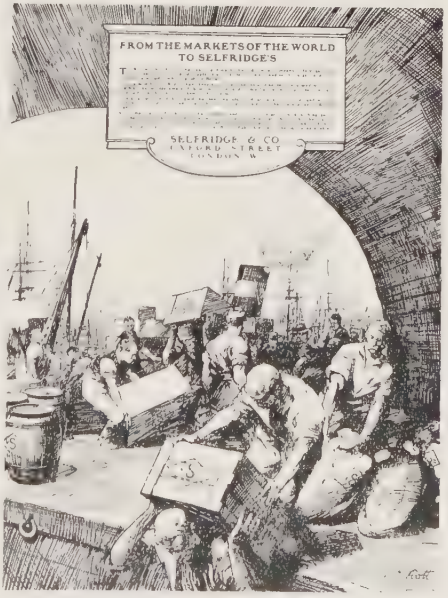
Much water has flowed under London Bridge since those young days of sixteen

By R. Anning Bell



By Walter Crane.

By Garth Jones.



By S. E. Scott

Reduced from Four Notable Whole-page Cartoons.

We are indebted to the Editor of the "Advertising World," and Messrs. W. H. Smith and Son, Ltd., for the loan of the blocks illustrating this article.—Ed., P.Y.B.

years ago. Bernard Shaw is now acknowledged one of Europe's master dramatists, Beardsley's genius became a byeword throughout the world of art, and Bernard Partridge now has a coveted seat at that most illustrious round table of the editorial office of "Punch."

Professor R. Anning Bell's "Confidence" is, perhaps, the most notable design in the semi-Florentine manner that has ever dignified the page of a newspaper. The arrangement of pure line decoration in non-mechanical, but easy balance, over the whole area, and the attractiveness of the central picture with its clean-printing qualities, make it one of the most entirely successful cartoons of the series.

In quite different treatment is the design "On Liberality" by Walter Crane. A whole chapter would scarcely suffice to outline the career of this artist—one of the few remaining links with the glorious days when Rossetti, Millais, Holman Hunt, G. F. Watts, Burne-Jones and William Morris—"the idle singer of an empty day"—wrote and painted masterpieces that mark an epoch in the history of modern art and literature. The very name "Walter Crane" has almost become part of our language, not to say a tradition. Were he not, like Ruskin and William Morris, so outspoken a Socialist, Royal honours and a title would long ago have been bestowed on him. In addition to the intrinsic merits of his cartoon it represents the weight and glamour of a personality unique among living artists.

"Dignity in Commerce," by Garth Jones, is another example of the wide range of treatment embraced in this series. The solid masses of black, mostly brushwork, are contrived by dexterous and well-balanced manipulation, not to look too heavy when printed full size. Little bits of drawing in the form of white lines are skilfully worked across the solids, emphasising the form of the drapery, and making it easier to print. Mr. Garth Jones, whose apprenticeship in drawing for reproduction has been ample and severe, has learnt much from the old German and Italian woodcuts, a trace of which is revealed in his shading of the face and arms.

"From the Markets of the World," by S. E. Scott, is one of the most "realistic" of the designs. The excellent composition and spirited draughtsmanship, with the good, firm, reed pen lines, make it one of the most successful of the series.

Mr. Selfridge has the same intuitive knack of finding the right men for the right work that is characteristic of all great organizers. He was wise enough not to meddle with the artists or their drawings, both of which require specialists to manipulate them. Messrs. W. H. Smith & Son, with whom he entrusted his £10,000 scheme, have during the last decade, by their good taste in printing, attained an enviable prominence among those who handle only the best quality work.

This rise of an old and almost historic house to recent eminence, is largely due to the introduction of "new blood," in the personalities of two young men with ideas balanced by executive ability, and though for commercial purposes their identity is merged into that of the firm, as this is not a commercial article, I desire to give honour where honour is due.

Mr. H. E. Morgan, the main-spring of the new *régime*, controls the mental and material equipment of the printing with the enthusiasm of youth and the knowledge of the craft gained on both sides of the Atlantic. All their work is planned and supervised, and original sketches made, by a staff of artists under the direction of Mr. R. P. Gossop. No mere business man could have selected so representative and interesting a group of artists, and no one merely an artist could have got the best work out of them—and up to time!

"SAUCINESS."

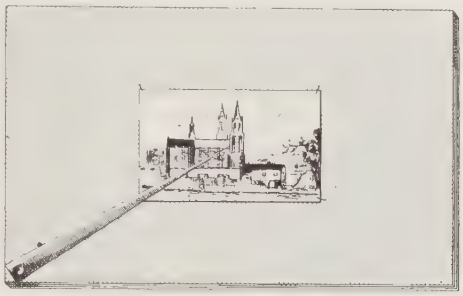
Colour blocks by :-
The Anglo Engraving Co., Ltd.
14 Farringdon Avenue,
LONDON. E.C.
And at Glasgow, Manchester & Paris

Inks by :- Shackell
Edwards & Co., Ltd.

May I Teach My Grandmother to ——— ?

By H. HANDS.

DURING a recent visit to England I had opportunities to see some of the process workshops, and it struck me as strange that, considering what a vast number of labour-saving appliances are available now-a-days, so many are content to waste time in obsolete methods. For the purpose of making a note for the next issue of the *P.Y.B.*, let me mention just one.



Penrose sells (if no one else does) a copying board on which an operator can centre his copy at once without dodging to and fro, peering through the focussing screen.

But even if one cannot buy an up-to-date board why cannot one use a dodge like this :—

A bit of cardboard pivoted at either bottom corner, with a stop a short distance from the pivot to prevent it from being raised higher than the centre (see above illustration).

A Comparatively New Powder Process.

By W. W. WALL.

AS one hears a good deal of powder processes of late, and it generally turns out to be the old and well-worn bichromate method, I am wondering whether anyone has ever tried this way which I give below. Anyway, it has the merit of being a little out of the ordinary.

Take White pepper (powdered) .. ½ lb.
Benzole ..... 20 ounces.

After soaking a short time, filter, and add

10 per cent sol. Gum dammar in benzole, 1 oz.
,, ,, Indiarubber ½ oz.

Refilter and pour over glass or highly glazed paper, expose under a transparency, then "powder up" with a brush or pledget of cotton-wool. A brisk and light brushing without powder, cleans up the picture and finishes it.

The amateur's first attempt will probably result in rather a foggy-looking sort of picture, but by either strengthening with more pepper or thinning down with benzole a point will be arrived at to suit his requirements.

This is essentially a "no water" process, and is excellent for duplicating lantern slides cheaply, also for ceramic work and intensifying negatives.

Any other clear resin will answer as well, such as sandarac, rosin, etc. Also ivy black, fir tree, or almost any evergreen, can be used instead of pepper, and will be found more rapid if one doesn't mind the extra trouble of drying the leaves first.

Before ending, let me say a word of caution as to powders. Many of the blues stain right over the high-lights. I have found that by making the powder "brittle" I can overcome this, and do it by mixing the "erring powder" with a little gum solution, drying and regrinding. For three-colour work special transparent powders are sold.

now " the whirligig of time brings in its revenges," and the cut is displacing the half-tone in the case instanced here. The latter has now become the exception where before it was the rule. The same thing is seen in many other directions, and the reasons which weighed with the photographic apparatus manufacturer and dealer have determined, and will continue to determine, to a large extent, the case for other traders. These reasons present themselves to our customers on a comparison of results as seen on the printed page in the case of the cheaper class of printing or, on the other hand, in the greatly increased figure on the printer's bill when good paper and printing have been indulged in, and with a correspondingly great increase in cost. It has thus been found by experience that the half-tone process must be discarded where the paper and printing do not permit of its merits being brought out. Not that there is anything wrong with the block itself; the poor results, too often seen, are to be accounted for by the fact that the printer cannot possibly produce a good job in half-tone printing when he is confined to the use of such paper, ink and machining as would suffice to produce a fairly good result in the case of the woodcut.

We see there is, therefore, still room for the woodcut; and for many purposes, as I have said, it has no rival. It is a good " printer," and will make a fair show even with the poorest paper, ink and printing; whereas good paper, stiff ink and intelligent " make-ready," along with comparatively slow printing, are absolutely necessary if the half-tone is to have a chance at all.

There is yet another fact which favours the woodcut; it is greatly superior to the half-tone in sharpness of detail, since in the latter a continuity of line does not exist, all being broken up by the criss-cross action of the screen, with the result of a great loss in definition. The line block, while possessing the continuity of line which belongs to the woodcut, is not able to compete in catalogue illustrations with its ancient rival, since with the line block the cost in producing any result approximating to the woodcut in character is prohibitive, for here the price has to cover the cost of making a large and perfectly shaded drawing in line for reproduction. And the resulting block, although it may imitate, in a way, a woodcut in character, is never equal to what a woodcut would be, being hard and unfeeling in appearance and having none of the rich juiciness of line so characteristic of the woodcut. While, therefore, the line block has its place and value these are certainly not to be found in its imitation of the modern woodcut with its mechanical perfection and artistic feeling.

But both processes have their uses and their limitations, and in order that the particular method—whether woodcut or process block—should be recommended without prejudice to the customer, it would seem to follow that photo-engravers should also be wood-engravers, and *vice versa*. In spite, however, of the fact—perhaps because of the fact—that the half-tone process has been exploited for all it is worth and more, the woodcut is, as I have said, once more asserting itself, although it can never again be what it was in the world of illustration; and till something better turns up the half-tone process will continue to occupy the major part of the field it has conquered, as well as to retain its hold upon the new domains it has created for itself, both in colour and monochrome. It must be, and it is indeed frankly recognised, that here the woodcut is no longer possible—although exquisite work has been done by it in three and four-colour, as was to be seen in the *Magazine of Illustration*.

But the woodcut has not passed. It is still in demand, and the demand is growing, and it is well able to retain all it has while re-occupying some of the ground it had lost.

S. A. Cattell & Co.

Photograph by Reinhold Thiele.

Baron Campbell von Laurentz.

(The Hero of Gravelotte.)

Dellagana & Co.

Photograph by Reinhold Thiele.

A Day with the Boy Scouts.

Half-tone Engraving Co., Ltd.

Drawn by Hanslip Fletcher.
By kind permission of Sir Isaac Pitman & Sons, Ltd.

Cliffords Inn.

From "London Passed and Passing."

Harrand & Fuller. *Photograph by Alf. Ellis & Walery.*

The Novice.

THE PASSING GLANCE

Colortype Reproduction by
American Colortype Company
New York Chicago

Discursive Notes on the Carbon Process and its Applications.

By E. W. FOXLEE.

MALINES.

BRITISH PHOTO ENGRAVING CO. Photograph by GODFREY BINGLEY.

NO process of photography yet introduced is capable of so many and varied applications as the carbon process. Pictures by it can be produced in any colour and on any material. This process is largely employed directly or indirectly in several of the photo-mechanical processes such as photogravure, Woodburytype, photographs on wood blocks for the engraver, akrotone, etc. Now it may not be generally known to some who are not fully conversant with the process that the material that is best suited for one purpose may not be the best for others, indeed it may possibly be the worst. For example, the carbon tissue that is specially made for, say, photogravure is not that which is suitable for wood blocks for the engraver, indeed, it is about the worst that that could be used for the purpose.

The object here will be to point out as briefly as possible the characteristics of the tissues that are the most suitable for some of the purposes for which they are to be employed, as well as to give some short practical hints as to the nature of the tissues that are necessary for different kinds of work. It may be pointed out here that a carbon picture, whatever it may be, is simply an image composed of varying thicknesses of gelatine holding a pigment. In fact, it is an image in more or less relief—the deepest shadows having the highest relief, the half-tones less and the high-lights practically no relief at all. The conditions that govern the degree of relief will be explained later on. We will first deal with

Photogravure.

For the negative picture on the copper plate we require a tissue that yields a fair amount of relief, so that there is a sufficient thickness of gelatine to protect the lights and half-tones from the action of the etching fluid until the shadows are bitten in to the desired depth. The tissue for our present purpose should be made with a gelatine of a fairly tough character and contain but a comparatively small quantity of pigment, and that of a more or less transparent nature, so as to permit of the light penetrating a good depth into it and thus give the requisite relief when the image is developed. The actual colour of the pigment is of little moment, it is a suitable relief only that is required. It may be mentioned that the Autotype Company supply special photogravure tissues in three different colours—red, brown and burnt sienna. There is no actual difference in the chemical composition of them; the question of the colours is chiefly one of taste on the part of those who do the etching. The last-named colour is the one that is preferred by most photogravurers here, and is employed exclusively by one or two of

the largest workers on the Continent that I could name. As I presume none of my readers would desire to make their own tissue for this process, I need not give formulæ—particularly as carbon tissue cannot be successfully made on a small scale, or without suitable appliances. The tissue is best sensitized in a moderately weak bath, say, three per cent. with two or three minutes' immersion at about 60°F. It works best, as a rule, when it is a day or so old, though not more, after sensitizing. The image should not be over printed, so that it can be developed at a moderate temperature.

Woodburytype.

For this process a very high relief is necessary. The tissue for it is not an article of commerce, as it can only be made in sheets, therefore the user has, perforce, to make it for himself. Here is a good formula for it.

Nelson's amber gelatine	$3\frac{1}{2}$ ounces.
Water	10 ounces.
Sugar (lump)	1 ounce.
Liquor ammonia	1 dram.
Glycerine	$1\frac{1}{2}$ drams.
Indian ink (rubbed up in 2 oz. water)	2 grains.
Carbolic acid (pure)	a drop or two.

The gelatine is soaked in the water until it is quite soft and then dissolved by heat. The other ingredients are then added and thoroughly mixed. Lastly, 5 drams of powdered bichromate of ammonia are dissolved in it and the solution strained through fine muslin, when it will be ready for use. Here is the *mode*. Some glass plates, after being thoroughly cleaned and rubbed over with French chalk, are coated with thick enamel collodion and allowed to dry spontaneously. The plates, after being warmed, are placed on levelling stands and the warm solution poured on in about the proportion of five ounces to the square foot. When the gelatine has set the plates are placed, face downward, over trays of well dried chloride of calcium in a dark closet. The drying will take from ten to twenty hours according to the dryness of the chloride of calcium and the temperature which, by the way, should not exceed 80° or 85°F. When dry the tissue is stripped off and is ready for printing. Here it will be seen that there is a large quantity of gelatine and a very small amount of colouring matter. Under these conditions the light, in printing, penetrates deeply into the film so that we get, when the image is developed, the very high relief that is so essential for the Woodburytype process. It may *en passant* be mentioned that for getting the highest relief very vigorous negatives must be used. Flat and feeble ones are of no use for this process.

Photographs on Wood-Blocks for the Engraver.

Here the very opposite conditions are required in the tissue. We want one that contains but a minimum of gelatine and a maximum of pigment, so that the light's action is confined to quite the surface of the tissue. The gelatine also should be of a special character. It should be one of a poor kind, that is, poor from a gelatine maker's point of view, and very soluble. Tissue for this work, so far as I am aware, is not a commercial article. Mr. Rheinlander, who had the greater part of this work in his hands for many years before he retired from business (after very many experiments), used to have his tissue specially made for him. It contained a gelatine such as just referred to with a large quantity of sugar added, and a very large amount of pigment. Hence the developed film in the blacks was exceedingly thin and of such a nature that it did not chip or peel up under the graver as ordinary carbon films would do. Tissue of this

character would be of no good for ordinary carbon printing. This and the Woodburytype tissue serve well to illustrate to the uninitiated that in working the carbon process for different purposes success or failure may depend entirely upon the character of the tissue employed.

The Akrotone Process of Amstutz.

This method of making half-tone printing blocks, I believe, is, as yet, not being commercially worked in this country. However, by the courtesy of Messrs. Penrose & Co., who possess the only apparatus for it in England, I have had the opportunity of seeing it working. It is essentially a carbon process. Briefly it is this. A carbon transparency is produced on a thin film of celluloid. This is placed on a metal cylinder with a piece of plain celluloid over it. The two films, by an ingenious arrangement, are clamped tightly together on the cylinder which, when rotating, has a slow lateral movement at an adjustable rate. Above is an adjustable cutting point like a graver. When working the graver cuts a series of fine lines in the celluloid, the depth of which is governed by the relief in the carbon print beneath it. In the highest lights the lines are cut deep and are very pronounced, while in the deepest shadows they are only very faint ones, or none at all. This film fixed on the ordinary printing block forms the printing surface. Here it will be seen that a considerable relief in the carbon print is a necessity, though not more than is obtainable with some of the ordinary tissues of commerce.

Ceramic Photography.

The carbon process under certain conditions is well suited for ceramic photography for the larger sizes. It was worked commercially some years ago by a well-known London firm, but finding at that time there was such a limited demand for the pictures that branch of its business was relinquished. Now, however, I learn that the process is again being utilized in this direction. The tissue for this, it goes without saying, must be pigmented with vitrifiable colours. Here we require a tissue made with a soft gelatine with a large proportion of sugar so that the developed image consists of a thin and somewhat rotten film. If it were thick and horny it would split off with the heat of the kiln instead of merely charring.

Carbon for Decorative Purposes.

The carbon process is frequently used for decorative purposes, such as pictures on door panels, screens and such like things. In producing them either the single or the double transfer method may be employed, but on the whole the latter is the most suitable. In practice the surface of the wood is made perfectly smooth with the finest glass paper, used in the direction of the grain of the wood only, care being taken that no scratches are left, for it must be kept in mind that if there were, even fine ones, they would show conspicuously in the finished picture, though they might be scarcely noticeable before. It goes without saying that the lighter coloured woods are the best for this purpose. The surface of the panel having been made perfectly smooth it should be given a thin coating of gelatine containing a little chrome alum and allowed to dry. This is merely to fill up the pores of the wood. If, however, that happens to be of a very porous kind, a second coating may be necessary. Should the gelatine surface, when dry, show streaks of the brush, they should be rubbed down with very fine glass paper. The print itself is made on flexible support in the ordinary way and allowed to dry. The following solution is then made :—

Nelson's No. 1 gelatine.....	2 ounces.
Water	1 quart.
Chrome alum (dissolved in 2 oz. water) ..	30 grains.

When the gelatine has been softened and dissolved by heat the chrome alum solution is poured in with continual stirring—both solutions being heated to about 160°F. or so, when they are mixed. The solution is then strained through fine muslin into a dish, kept at about the above temperature, somewhat larger than the picture to be dealt with. The panel is then put together with the picture on its support in the solution. The two are then brought into contact, avoiding air-bubbles, squeegeed together and allowed to dry. When dry the flexible support is stripped off and the picture is so far finished. It now only requires to be varnished with a pale varnish, or, better still, French polished with a white polish, that is, one made with bleached lac.

Carbon for Window Decorations.

While on the subject of this process for decorative purposes, it may be mentioned that it is the best of all for transparencies for window decoration, as by it the pictures can be produced in any colour or tint while the lights are quite clear glass, which gives them a brilliancy that is not obtained with any other photographic process. For these any tissue may be used, and not necessarily the special transparency tissue. Tissues that are thin of pigment, like most of the portrait tissues, may be used, as when they are backed up with ground glass they will be quite dense enough.

Photographs on Ivory for Miniature Painting.

These are produced in just the same way as those on wood panels. In either case the tissue, and the negative, used should be such as will yield but little relief, as a high relief in these pictures would be objectionable, especially with miniatures.

A little-known Application of the Carbon Process.

It may not be generally known that a large proportion of the labels on the bottles that one sees on the shelves of druggists are produced by the carbon process. The way they are done is this. The lettering is first done on a large scale on cardboard—white letters on a black ground. This is then photographed of the different sizes required, the negatives being made very strong and dense. Prints are then made in a dense black tissue and developed on thin curved glasses similar to the curvature of the bottles; the borders of the negatives being masked to the shape desired so that they, like the lettering, show as clear glass. The letters are then gilded and the borders embellished with gold or colour. When finished this curved glass is cemented in a recess, moulded in the side of the bottle to receive it. The advantage of this method is that as the lettering, etc., is between the thin glass and the bottle it does not suffer in the least by continual dusting, as it does when it is painted direct on the bottle.

Concluding Notes.

The space at my disposal will not permit of my enumerating nearly all the useful applications of the carbon process, though it may be mentioned that it is applicable to the production of photographs on such things as watch cases, cigarette cases, bijoutry, canvas as a basis for oil painting, transparencies for making enlarged negatives from, etc., etc.

From what has been said it will be gathered that the relief to be obtained in a carbon image depends very much upon the quantity and the transparency of the pigment in the tissue. This quality may, practically, be judged of by looking through the tissue before a strong light. Some—such as most of the portrait browns—will seem very transparent, while others such as the black or the special transparency will appear almost if not quite opaque. It is the former

that will yield the greatest relief in the developed image, while the latter will give little, or no apparent relief. The negative used is also an important factor as regards the relief obtainable, and this cannot be too strongly emphasized. If a high relief is required a vigorous negative is imperative. With that and a transparent tissue—that is, one with little pigment, the light will go deeply into the shadows and thus render the film in those parts insoluble before it gets through the half-tones and the lights. On the other hand, with a dense tissue and a feeble negative, *i.e.*, one lacking in contrasts, the light's action is confined almost entirely to the surface, so that we get practically no relief at all, yet that is just what is required for some purposes.

In conclusion, I may mention that when only small quantities of tissue are required the most convenient way of sensitizing it is with the spirit sensitizer introduced some time back by the Autotype Company. With that the tissue dries in less than half an hour, and is then ready for use. Not the least advantage of this system of sensitizing is that when the tissue is dry it is in the right condition for use. That is not always the case when it is sensitized in the usual way unless suitable drying arrangements are at command.

OFF THE DUTCH COAST.

W. & G. BAIRD, LTD.

Photograph by
S. L. COULTHURST.

"The Press Person."

By JOHN P. GLOVER.

THE LANCER.

LYTH ENGRAVING CO. Photograph by J. P. GLOVER.

AFTER a dusty climb on my trusty motor cycle, I found myself on the rolling downs of Salisbury Plain, and soon, by following the tracks of the camp-follower and the caterer, I found Pond Farm Camp, and alighted there in the interest of the Editor of a country journal.

Wandering amongst rows of tethered horses, musing the while over memories of my old Volunteer days, I soon became aware of some movement amongst the sleepy Cavalrymen taking their mid-day siesta. Anon a squad of Buglers formed up in a line on the grassy sward, and it was evident that a harmonized bugle-call was to be performed.

Promptly my back was presented to the squad and the Sergeant in command, what time I carefully adjusted the range of my hand camera. As the first notes sounded, my position was reversed, and buglers and sergeant were instantly secured in a very effective manner. But I had not escaped attention, and observed a languid Cavalry Officer of imposing mien cantering my way. Round I turned again, and with only my little lens showing under my arm, I released the shutter on Lieut. Viscount ———, and turned to face his unconscious Lordship's commands.

"Er, have you a per*mit* to photograph here?"

I produced the card of the —— *Times*, examining the insignia of my victim the while.

"Oh, you are a Press *Person*," and exit.

Never before had I realized the intense ignominy expressed in the innocent little word "person."

Nothing daunted, the Press Person changed his plate and went further afield for new prizes.

While I watched the instant effect of that bugle call to field manœuvres with increasing interest in the wonderful mobility of those erstwhile sleepy Cavalrymen, I soon realized that I was missing the chance of the day, and to my chagrin the corps had taken order at the other end of the camp, and fled out of range in imposing array ere I could scamper across the camp ground on foot. This gave me a damper, and I began to call myself very bad names for an amateur Press Person.

However, I had not come all those dizzy miles across country to return

with unexposed plates, and my further experiences that day taught me that successful Press photos are mostly secured from "bits" around camp, rather than from great arrays of military men and mounts stretching away into the fuzzy distance. *Verb Sap.*

The 21st Lancers had been out in the early morning, and I now found the men at play in between the long rows of glistening white tents. Here I improved the shining hour by exposing a plate on the game of "Checkers," and began to see possibilities of pictures, despite the escape of the vanished Lancers. My next experiment was suggested by the sounds of the well-remembered bugle call of "Come to the cookhouse door, Boys," and I arrived there in response just in time to photograph Tommy Cook ladling out the steaming potatoes and chops.

I naturally concluded the effects of so bounteous fare would have the effect

THE BARBER'S SHOP.

LASCELLES & Co. Photograph by J. P. GLOVER.

of sending my victims into a sound sleep in the sunshine, but soon discovered my mistake. The return of the absent troop of Lancers was to herald a general parade, and I became aware that the Company's Barber was getting very busy. Here at last I should find Thomas Atkins facing the blades, and sure enough the "Barber's Shop" revealed him fearlessly going into action.

At length a moving line over the distant hills presaged the return of the Lancers, and this time I had my gun in position.

But I had learned somewhat from my failures and successes, and though the great line of advancing horses looked imposing, I waited with finger on release until the troops came to close quarters, and contented myself with an effective figure of one of the Lancers as he slowly measured the last few yards into camp.

Back along the rapidly diminishing miles of dust-choked roads, with joyous exhilaration in the sunshine tempered by a home-made breeze, and my plates developed themselves while I took tea, were fixed anon, and after a rinse were placed in the enlarging camera wet ; enlargements made on glossy bromide in a few moments, dried in spirit, and delivered to my Editor and despatched by him to the block-maker by the evening post, to appear two days later in the weekly issue.

A Game of Checkers.

Photochrom Co.

Photograph by J. P. Glover.

John Swain & Son. Ltd.

By kind permission of Messrs. Turner & Dunnett, Liverpool.

"The Mouth of the Mersey."

Photograph by Valentine & Sons, Ltd.

Inks by Shackell, Edwards & Co., Ltd.

In Hackfall Glen, Yorks.

(Produced in two printings.)

Economy in Colour Printing.

By ILSTON COX.

A Cameo.

Johnston Engraving Co.

Photograph by E. W. Jackson.

PREVIOUS articles I have written on Colour Printing in two workings having had reference to the use of a lemon paper, which, of necessity, is limited in its use, I propose now to refer to another economic method of printing for which only white paper need be used.

The accompanying inset issued by Messrs. Shackell, Edwards & Co., Ltd., is, I believe, the first of its kind that has been published and is an adaptation of what is known to some litho. and type printers as " rainbow " printing.

This inset, as is thereon stated, is printed in two workings only, and the two blocks used are both made from the same original. There is, however, a difference in the plates, as although the picture is twice photographed through the same screen, the latter is tilted for the second photo., so that there is an angle of 33° between the lines of the two negatives.

The importance of this procedure is more fully recognised when one compares the results from blocks so made with a double impression from a single half-tone block. This simple variation, however, is not sufficient to give a good two colour effect, as it is necessary that the plate etcher should be something of an artist, so that the etching of portions of each plate may be increased or retarded according to the strength of colour required in various parts of the picture.

This is clearly shown in the inset previously referred to, as it will be seen that in the sky a slight impression only is received from the key block last printed in comparison with that taken from the tint block.

The two inks used with the first plate being worked simultaneously are, of course, separated by a " stop " in the ink duct, and are afterwards blended together by the action of the rollers on the inking slab, to such an extent that a middle band of colour is obtained, differing in shade from either of the inks employed.

The key block may be printed in a black ink or with a dark colour. The former will give a sharper and stronger appearance to the picture, but a colour such as sepia will convey warmth and a soft finish to the print.

Ordinary letterpress machines may be used for this class of work, but those with " wavers " should have these locked to prevent the waving motion. Small machines having a revolving ink slab could not of course be used for this process.

In the case of long runs when it is desirable to use more than one set of blocks, it is quite possible to print any number " up " with good register all through, as long as the blocks are placed tête bêche in the forme.

I do not suppose that this form of colour printing will be in great demand, as those subjects having very irregular features cannot well be treated with uniform bands of colour, and so of necessity the subject must, to some extent, be chosen to suit the process.

Be this as it may, there might nevertheless be a variety of work turned out in this manner, as there are and always will be a number of orders which printers are obliged to execute in black or monochrome because the cost of trichromatic printing is prohibitive. It is in such cases, therefore, that this process might be of service.

THE COMING STORM.

E. HULTON & CO., LTD.

Photograph by
F. G. CURZON.

"What of the Future?"

By FREDERIC T. CORKETT.

E. Hamel & Co. Photograph by Freckleton & Co.

THE future of the reproductive art is perhaps more difficult to forecast than many who know the present happenings imagine, the great reason being that it is not always the best process that succeeds, or has the largest vogue. It is "the man behind the gun," the organization behind the process, that to a great extent makes or mars the success of a business. This is seen in the world of process, as in every department of commercial life, and I think it is to-day apparent as ever. Then again, one man sees a fortune, where another cannot even see an opening. It is the old, old proverb over again, that "one man's drink is another man's poison."

The public, however, are ever getting more appreciative of all that is best in printerdom and engraverland, and one may feel sure that the best will come to the top in time. It is equally true, however, that by want of enthusiasm or good business direction, or wrong application, those who are striving in a new direction may be discouraged from their efforts and forced back to older and more tried methods.

In process reproduction there are a good many open fields which have never been fully explored, or their limits and possibilities realized or exploited.

I believe that three-colour (or four-colour, for that matter) half-tone typographic printing has reached its limit, in other words, there is little possibility of getting further advancement, or a nearer facsimile by this process.

I make this statement with the knowledge of almost every important worker's turn-out in this direction, and I say that while the bulk of the work produced is fairly satisfactory, yet it is by no means wholly so.

The three-colour typographic worker of to-day pulls his proofs and the printer prints his edition on coated papers that rapidly deteriorate and have no life in them. If one wishes to gauge the fugitive character of the inks used, even a casual examination of tri-colour work which has had but a few days' direct acquaintanceship with old Sol, will solve that point without question. I shall not, however, regret that much of this work is lost to the world, for by far the greater proportion is not worth the keeping.

If typographic three-colour half-tone has nothing more to show us, and in quality can go no further than its present showing, in which direction then must we look for future development and improvement?

In my opinion there are two directions and two important fields from which that will-o'-the-wisp facsimile may come.

The most important is undoubtedly machine intaglio, while the other, may probably be a certain application of lithographic work. I say probably, for I am by no means so sure of this lithographic method as I am of machine intaglio.

Those printers and engravers who have seen the latest work in screen intaglio, printed in colours on rotary machinery, have been astounded at the beautiful

result obtainable by this method. The work can be printed on almost any paper (not the heavy surface-coated papers) and gives a most artistic result. Such roundness and fulness as is given by this process is not possible to be produced from a flat printing surface.

I have no authority to speak for the present printers of the process in England, so that when I say that their latest work stands out as the most beautiful printing process yet devised, I am only stating the facts with bare justice.

Photogravure printing, since its invention, has been recognised as the king of reproductive processes, and when this process, adapted to fast running presses, is in more general use, and it will be in the near future, such results will be produced as will put half-tone typographic three-colour work out of court.

That there are trade secrets connected with the work is common knowledge. That for certain classes of work (*i.e.*, where letterpress is required to be printed at the same time) the process will not apply must be apparent to all; yet for all the purposes where superior illustration is required, everything points to this being the method of the future.

As to the other method to which I refer, and to which I have before alluded, I foresee that if this process is properly exploited (much depends on this) and if the machinery, of which so much has been heard, does all it claims to do, then commercial colour work of high quality will certainly be done, and that for all general commercial purposes this process will be a serious competitor to typographic half-tone. I have, however, seen as good things in process before as this lithographic colour process pass into the oblivion of the past.

As there now seems to be no real difficulty in the way of working the method, and as special machinery is now on the market, I do not see why any enterprising printer cannot take up the work. Strange to say, however, that while I have heard so much of the process and its work, I have never yet seen artistic colour work guaranteed to be printed on the special high-speed machines which are claimed to be built specially for it; this, too, although I have applied to printers supposed to be actually printing the work and to certain of the machine makers who claim to be making the machines. If their high-speed lithographic machines will print satisfactory work equal to the hand-pulled proofs of the process I have seen, I can only say to half-tone engravers and printers, "Look out, you have a hot time coming." For real beauty of result this lithographic work cannot compare with intaglio, which has its own field. The two processes, however, seem to me to completely cover all that trichromatic half-tone can do, and in the case of intaglio in a much superior manner.

So much for the outlook from the printers' and engravers' point of view. What of the future from the publishers' aspect? This year of 1909 has, up to the time of writing, not been an improvement on its bad predecessor. There has been a lull in art publication, and every publisher has been more or less "marking time." No illustrated publication of any note or special merit has marked the year. The enterprising American publishers are sending over more of their publications, post-cards, calendars, magazines, etc. The goods are not "dumped" on the market, but, like American organs, typewriters, watches and cash registers, as our American friends say, they "fill the bill." The American publishing houses now look upon Great Britain as a section of their legitimate ground, and American trade competition must be taken into consideration by British houses as a part of the opposition in business to be met with.

Some of the British publishers seem to have arrived at that state where they imagine that all that is worth doing, has been done, and that there is nothing further to do. To these I say, "There are as good fish in the sea as ever came out."

E. Hamel & Co.

Photograph by Freckleton & Co.

A Portrait.

Carl Hentschel, Ltd.

Photograph by Harold G. Grainger.

Newton-upon-Ouse, near York.

Lascelles & Co.

Photograph by Lancelot Usher.

Glencairn, Cape Colony.

Bourne & Co.

Photograph by Ellis & Walery.

Lewis Waller as Henry V.

Lascelles & Co.

Photograph by Reinhold Thiele.

Lieutenant Sampson Sladen.

(The New Chief of the M.F.B.)

Helios.

Photograph by G. Middendorp.

Interior.

Helios. *Photograph by W. van Zanen.*

Autumn.

E. Hamel & Co.

Photograph by Freckleton & Co.

Innocent Youth.

Four Subjects on One Plate.

By ERNEST MARRIAGE, F.R.P.S.

"One, Two, Buckle my Shoe."

Photochrom Co. Photograph by K. F. Bishop.

To be able to take four subjects on the different quarters of one plate, two requirements must be fulfilled: there must be a means of protecting three-quarters of the plate from light whilst the remaining quarter is receiving the exposure, and there must be some means of placing the lens so that it is opposite the centre of the part of the plate which is to be exposed. The latter condition is very generally neglected, so I propose to deal mainly with the centring of the lens.

The protection of the requisite portions of the plate from light is a simple matter with most cameras possessed of a reversing back. A piece of black paper free from pinholes, or thin card, is cut to the exact size of the recess in the camera that takes the reversing back. There is generally sufficient space to allow the reversing back to be put back and fastened in its place, so holding the paper or card in position. After the fitting, etc., is found to be satisfactory, a square exactly one quarter of the size of the masking paper or card is cut out of one corner, resulting in a mask as shown in Fig. 1. It will be seen that if this mask is turned a quarter round after each exposure the four quarters of the plate may be exposed in rotation.

It is not so easy to arrange means of centring the lens in turn on each quarter of the plate. Very few cases would arise where four exposures would be required on anything less than a half-plate. Let us see what are the requirements for this size. If the plate is upright the lens must be capable of movement by cross front $1\frac{3}{16}$ inches, by rising or falling front $1\frac{5}{8}$ inches, away from the centre of the half-plate. It is necessary, however, to be able to give the maximum movement, *viz.*, $1\frac{5}{8}$ inches, with both cross and rising fronts in order to deal also with the plate in the horizontal position. Only the square form of camera with parallel bellows will allow of both these movements in sufficient extent, and the type of front used with these cameras is shown in Fig. 2, slightly modified, however, to meet the present requirements.

The rising and cross fronts are shown in Fig. 2 in heavy outline; the thin outer line shows the body of the camera front, in which the rising front slides. The brass slot plates are solid black, as is also the flange for the lens; the binding screws are clearly indicated. The dotted lines in the diagram represent the opening in the body of the camera behind the fronts. The main feature of both rising and cross fronts is that they are reversible. In the position illustrated the front can be

raised whilst the cross front gives the maximum movement from the centre to the right, that is to say, the top right-hand quarter of the plate could be exposed. By taking out he binding screw on the cross front, sliding the latter out and putting it in again with the slot below, the slot will then come over the screw socket (seen below the lens flange) which takes the binding screw, and the cross front will slide to the left as much as it previously moved to the right. This will allow the top left-hand quarter of the plate to receive its exposure. Similarly, by putting the rising front in the other way up, a fall equal to the original rise is obtainable, and the lower quarters of the plate are exposed in their turn.

It will be seen that the cross front need not, when packed up, project sideways beyond the body of the camera. The rising front is made rather shorter than the camera frame, in order that the maximum fall may be obtained without any part of the rising front projecting below the baseboard of the camera, which might

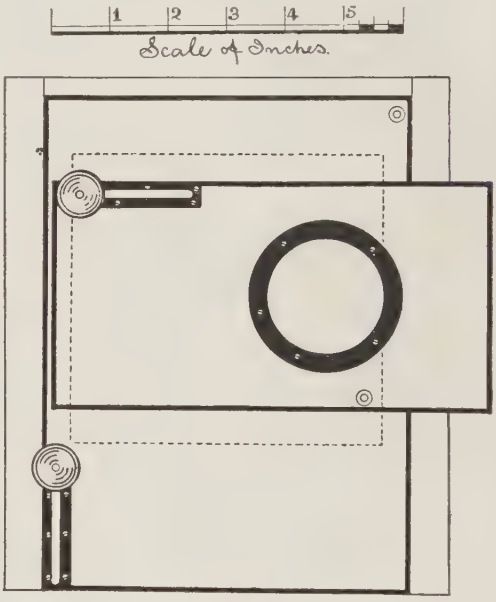


Fig. 2.

be a disadvantage in some cases ; for instance, when a tilting table is in use. Except for this consideration, I should have the rising front the same length as the camera. Quite apart from the special object set out in my title, this arrangement of fronts gives a greater range of adjustment than the ordinary pattern without any compensating disadvantages, and should be useful to architectural and technical photographers.

Of the two adjustments the rising and falling front is much the more important. In ordinary work, turning the camera round on the tripod top accomplishes pretty much the same result as moving the lens laterally. But the equivalent of the vertical adjustment (the use of the rising front) is tilting the camera either up or down, which necessitates swinging the back of the camera to the perpendicular and either the sacrifice of definition or the use of a small stop. Results by the two systems are shown in Figs. 3 and 4.

The same lens was used for each plate, a 6-inch anastigmat, throughout at its full aperture $f/5{\cdot}6$; the size of plate is 5×4. In Fig. 3 the movements away from the centre were

2	Cross front ..	$\frac{5}{8}$ inches.	1	Cross front ..	$1\frac{1}{4}$ inches.
	Fall	$\frac{13}{16}$,,		Fall	$\frac{13}{16}$,,
4	Cross front ..	$1\frac{1}{4}$,,	3	Cross front ..	$\frac{5}{8}$,,
	Rise	$1\frac{3}{8}$,,		Rise	$1\frac{3}{8}$,,

These particulars are arranged in the same relative positions as the divisions in the block. There is very little difference between the prints of this series, the main feature in all is that the almond tree in blossom, which may be considered as an object in one plane, is equally sharp throughout.

Coming next to Fig. 4, the lens was kept in the centre of the camera front throughout. For the two upper prints, the camera was pointed downwards

Fig. 3.

Fig. 4.

and the back swung until perpendicular through about 6°. The lower prints required an upward tilt of 14°, and the camera back was swung to a corresponding extent. There is a very distinct falling off in the definition of the upper part of each little print, notice particularly the almond tree. To secure equal definition in that near plane would have required a stop of $f/18$ in the upper and $f/42$ in the lower exposures. No record was kept of the amount of turn given to the camera by which the lateral adjustment was made.

Had these experiments been made with a lens of greater focal length, the difference between the results would have been less marked, as the amount of tilt required under the conditions as in Fig. 4 is reduced. But it is a fair assumption that a lens of short focal length will be required when the subject has to be included in so small a space.

The conditions prevailing are considerably altered with copying or indoor work generally, as the object to be photographed may be moved. It cannot, however, be gainsaid that the correct theoretical position for the lens in copying work is opposite the centre of the plate ; and apart from this, the cross and rising front are useful purely to adjust the subject to the space on the plate. The alternative of moving the subject is not generally so much under control, whilst turning or tilting the camera is quite inadmissible.

To conclude this article with a return to a variation on the original theme, the utility of a focal plane shutter in exceptional cases may be pointed out. If there happen to be a series of long narrow subjects to be photographed, laces, for example, the slit in the shutter may be used instead of the opening in the mask Fig. 1, and after each exposure the shutter is wound up a little to expose another strip of the plate.

CHRISTMAS CHEER.

HILL & Co.

Photograph by
E. W. JACKSON.

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TRISTAN AND ISOLDE

Four-Color Blocks by
The Zeese-Wilkinson Co.
New York

The Watford Engraving Co.

Photo by Fredk. Downer & Sons.

H.M. The King.

T. B. Browne, Ltd.

Photograph by Alfred Ellis & Walery.

Miss Dorothea Baird.

In Realms of Fancy.

Two-Colour Half-tone engraved and printed by
Andre & Sleigh, Ltd.

Possibilities of the Die Press for Gravure Printing.

By CHAS. DAWSON.

QUIET WATERS.

CLARKE ENGRAVING CO. Photograph by S. G. KIMBER, F.R.P.S.

IN view of the great success of the Rembrandt process, and the fact that the press used is but little adapted to the requirements of smaller firms, there has been of late much attention directed to the use of the die press for gravure printing.

There are several die presses now on the market all more or less adapted to this work, and all capable of doing it automatically and at a pretty high rate of speed, but they call for a special kind of plate so far, and will not deal with the dust grain gravure as ordinarily made, though I cannot but think that by the use of special grain giving great holding power good results might be obtained.

In this connection it may be pointed out that one great difficulty arises from the fact that the press operators are mostly only accustomed to the regular die-press work, as seen on high class stationery, and are not versed in the art side of printing—this results in unsatisfactory work and disappointment to all concerned.

Most of the presses use a band of paper to remove the surplus ink, but one or two use a knife or series of knives for this purpose. These two systems have each their advantages and disadvantages, and they call for entirely different plates. The paper band system tends to take the ink out much as the canvas does in hand printing, while the knife leaves a full line or dot. A serious drawback of the paper wipe lies in the tendency to rough spots in the band, causing defects in the prints, but this may be overcome by the use of specially prepared paper for the bands; it is, indeed, of the greatest importance that proper paper be used for the wiping, as by varying the surface of the band greatly differing results may be obtained, this, plus the possible variation in the consistency of the ink, gives a good deal of latitude to the skilled printer.

The chief difference between the work turned out by the paper wipe and the knife wipe is that the former leaves the surface of the ink below that of the plate, so when the paper is laid on and pressure applied the paper is first brought into contact with the metal surface of the plate, this prevents the ink from being forced out of the dots or lines on to the clean metal, the resulting print being free from what the copper-plate printer calls "drag." Where the knife wipe is employed the surface of the ink which the lines or dots contain tends, if anything, to be above the surface of the metal, so that the pressure comes first on to the ink, which is thus forced out of the lines or dots on to the clean metal, producing a blurred effect; in some cases this may actually improve the effect of the picture but it renders it extremely difficult to make plates yield the desired result and effect, because the dots in the light tints have to be so extremely small and also very shallow.

In the case of knife wiping it is absolutely necessary to harden the plate, as otherwise there is a great danger of scratching it ; in the case of the paper wipe it is not necessary to harden the plate, unless a large number of impressions are called for, though this is generally done.

So far the only satisfactory kind of plates have been those made by a modification of the half-tone method, using a transparency in place of a negative ; the chief difficulty lies in the very fact of the reversal of the whole process, while in the relief process the tendency is towards lightening the tone of the plate by etching ; in intaglio process the reverse takes place and the action of etching tends to enlarge the ink-holding quality, so that to obtain the small dots in the lights the same care must be taken which secures the small white dots in the darks of the relief block. Then again, the tendency to darken follows in the act of printing, while the little white dots tend to fill in with ink and become reduced in the relief, they enlarge during printing in the intaglio. All this entails great care and perfection in the working, and large allowances have to be made at every stage in order that the desired effect may be obtained in the machine print ; until this machine print is actually made it is uncertain what will be the result of all one's work ; a print made by hand on the roller press is little or no guide to what will occur on the die press.

It would appear to the writer that there has been really very little done towards the adaptation of the die press to the requirements of gravure printing, and this is a real pity, because there is an enormous opening for the class of work possible on this machine when well adapted to the process work ; the most desirable feature is the use of a stiffer ink, as that used on all die presses is merely " paint," and in no way resembles the ordinary gravure ink as used by art printers. In America a kind of ink is in use which wipes very freely at a temperature of about eighty degrees, and which is filled into the plate by means of a roller composed of discs of cloth compressed together. Now it would seem an easy matter to adapt the die press to the use of this ink by employing a different system of wiping, one more resembling the action of the hand printer.

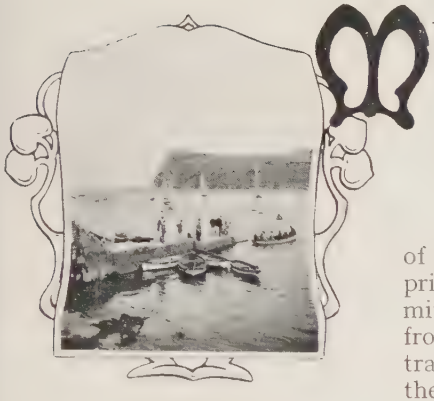
When we consider that the die press is capable of producing from one thousand to fifteen hundred impressions per hour it must be apparent that its successful use for gravure printing must revolutionize the book illustration trade. When all is said and done, there is a quality about the intaglio print which nothing else can rival or imitate. The " velvety " effect produced by the ink being raised above the surface of the paper, coupled with the fine density produced by that same " piled " surface, renders the impression taken from an intaglio plate always incomparably superior to any other kind of print.

Another very valuable point in connection with the mechanical method of printing gravures is the perfect register which can be secured and the use of dry paper, enabling colour plates or blocks to be printed first and the die-press-printed gravure last as a key. This produces the very finest kind of colour work quite along the lines of the Baxter system and similar to the four-block colour work which so much obtains at present.

We may confidently look forward to great advances in the use of the die press for all purposes where fine art illustration is called for, and where, though the effect of the gravure is desired, it is found impossible to meet the expense on the one hand, or to provide the numbers wanted in a given time on the other.

On taking Tricolour Negatives with a Single Exposure Tricolour Camera.

By E. T. BUTLER.



PORT ERIN, ISLE OF MAN.

Photograph by
WESTERN MAIL LTD. W. P. THOMSON.

MANY well-known rules of ordinary photography are applicable in securing good printable negatives for colour work. The character of negatives to be aimed at should be that best adapted to the method of printing.

The aim should be to get as much spirit into the negatives as the printing methods employed will render.

Transparencies will stand the negatives being of greater contrast than those used for paper printing, because transparencies are seen by transmitted light, which is stronger than that reflected from a white ground. Details in the shadows of transparencies are revealed that would be lost in the weaker light reflected from the white ground of a paper print. Exposure and development, of course, affect the character of the negatives ; short exposures and long development with strong developers tend to greater contrast, while long exposures and short development with weak developers flatten the image and cramp all the tones within a narrow range.

Subjects of severe contrast have to be thus flattened in order to get the full range of tones.

All subjects are not equally suitable for colour representation.

The choice and selection will be mainly matters of individual preference, but speaking generally, subjects of very strong contrast should be avoided, or, when they are attempted, they will require special treatment.

Where bright sky comes in sharp contrast with dark landscape, details in sky or foreground, or in both, are apt to be lost. Of course this applies to black and white photography also, but much more to colour, where three printings are to be superimposed, and the liability to lose detail thus increased if the negatives are too steep in gradation. On the other hand, flat, spiritless negatives do not yield satisfactory prints.

The character of the negatives should be such, that, when the three images are superimposed, the intensity of the shadows should not exceed the power of the light to reveal detail in them.

And the density of the lights of the negatives should not be such as to lose the secondary lights in the superimposed prints.

Exposures in colour work are greatly prolonged in comparison with black and white photography.

The first consideration is therefore to have a good rigid camera stand that will not be liable to vibrate with a slight wind.

As regards lighting and stopping down, subjects which change rapidly require good lighting and quick exposures, using large apertures, for although each negative records the same movement it is well to have no movement apparent,

of course. Moving waves and fields of waving corn, or light and shadow moving in quick succession over the same portion of the landscape, require the quickest exposures consistent with colour rendering.

In using large apertures it is inadvisable to include very near objects in the same picture with middle and extreme distances, no nearer than can be rendered sharply with lens set to infinity focus for landscapes of this class. In flower subjects, the petals and leaves tend to droop and curl if exposures are too long, so the subject should be set in good light and so arranged that the different planes may be rendered sharply by the depth of focus obtainable by the lens ; this, of course, varies with the stop used. A mirror may sometimes with advantage be used as a reflector to light up dark shadows, and the exposures should be long enough to get out all the details of the dark parts.

As to the duration of exposures, whether a matter of fractions of a second or of several hours, it is possible to be seldom wrong if one has a little experience and an actinometer. It is quite a simple matter to calculate the proper time of exposure (and a little latitude in this respect is not always fatal to good results).

Actinometer time is the standard from which such calculations are made.

Actinometer time is the time required to change Wynne's Special Quick Paper ("Deadmatch") to the darker standard tint of Wynne's Actinometer when exposed to the same light which the subject receives.

Correct Exposure.

When the range of tones in a subject to be photographed is included in the difference between black and white, correct exposure may be secured in from $\frac{1}{4}$ to full Actinometer time at *f*/6 diaphragm. An open sunlit landscape may be secured in from $\frac{1}{4}$ second to 1 second, that is $\frac{1}{16}$ to $\frac{1}{4}$ of Actinometer time. Double or quadruple if the shadows are very strong.

A sunset requires from 5 to 10 seconds at *f*/6.

Exposures of Portraits.

The Actinometer should be placed where it will receive the same light as the sitter.

Count the seconds required to change the paper, then

For Head and Bust $\frac{1}{2}$ that time at *f*/6.

Actinometer time at *f*/8.

Multiply according to the smaller stop used.

Flower Subjects. Same.

This may be doubled or quadrupled if the Camera is very near the subject, and the photograph required one-half or three-quarter size of the object photographed.

Five minutes' development with Amidol of normal strength at 60° should give good printing densities when exposures are correct.

The Use and Care of the Camera.

In using the Camera the following considerations should be attended to.

Tri-colour Cameras as now adjusted may, by preference, be used with only one kind of plate—Wratten and Wainright's Panchromatic—for all the three negatives.

The same adjustment of screens in the Camera does also for the following plates, *viz.* :—

Panchromatic for Red
Verichrome for Green.
Ordinary for Blue.

The Cameras take one negative on the Red-taking plate direct and the Green and Blue by reflection, so that the Red-taking p ate faces the other two.

This comes right for some methods of printing, but for others one or two have to be reversed. For Transparencies the films thus face each other—Glass outside. For Collotype printing where the negatives are required the reverse way, it is only necessary to reverse the blue printer.

When all are required the right way the two taken by reflection may be taken unreversed in the Camera by placing the glass side of the sensitive plates in the dark slides to face the lens. This entails no extra operation when the negatives are taken in the Camera without reversal. Neither is there any difficulty when enlarged transparencies are to be made for methods such as pinatype.

The negatives requiring to be reversed are simply put in the enlarger with glass side to lens, taking the precaution to place a sheet of glass before the other negative of the series that is not to be reversed.

This ensures all being enlarged equally, the negatives being at the same distance from the lens and the rays having to pass through the same thickness of glass.

When taking the negatives reversed in the Camera, a sheet of glass should be placed before the sensitive plate or plates for those not required to be reversed, or, alternatively, dark slides of special register are made and may be used without the plain glass.

An objection to reversing the plate in the Camera is that the back of the plate must be clean to get a clean negative. This also applies to the Reflectors and Screens of the Camera. The Camera should not be left exposed to dust but be covered up after using. If dust should gather on the reflectors it may be removed with a handkerchief (silk).

The lens panel may be removed for that purpose, and when necessary the top blue screen may be removed, but not the green one.

The reflectors must not on any account be removed or interfered with in any way. If for any purpose the blue screen has been removed be careful to replace it again in the same way, same side up and the diamond mark at the draw end. Remove only when really necessary.

It is important that the sensitive plates should be held in the dark slides close up to the register to ensure images of identical size.

Double Dark Slides.

In using one side only of a double slide a glass plate should be placed in the other side to prevent the sensitive plate from falling away from its position.

A due appreciation of the means of controlling effects affords the artist a power of rendering his impressions of nature, though they may not appeal to one who says there is no art in photography, and who regards only its mechanical aspect.

It may be said there is no such thing as an exact transcript of natural effects by any method of reproduction whatever, photographic or otherwise.

A close appearance of truthfulness may be attained in all of them. The whole gamut of tones seen in the natural lighting of landscapes and other subjects and correspondingly the whole range of colours in the same has to be transcribed in flatter tones in the reproduction or they will not appear true.

In other words, natural tones have all to be falsified in order that they may all in their varying and relative intensities be crowded into the narrow range permitted in the reproductions, whose highest lights do not exceed white and whose deepest shadow cannot be deeper than black.

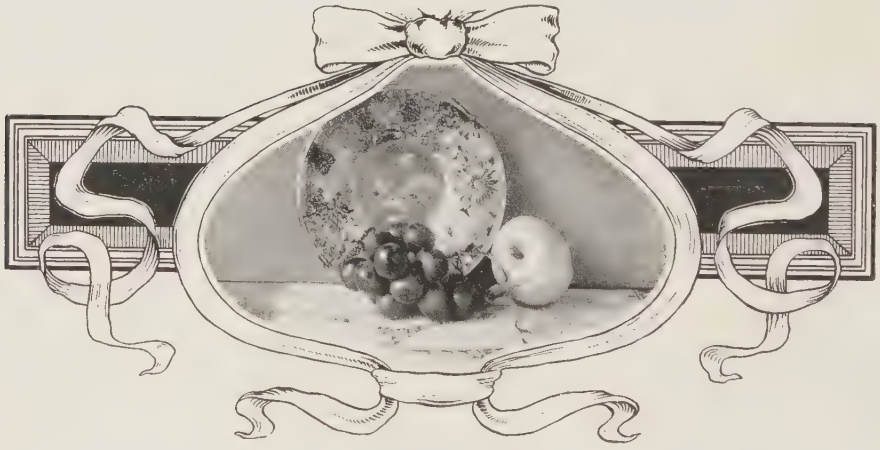
When colour is in question the range is confined to perhaps 3/5ths of these limits.

To represent a perfect white and a perfectly black object, seen in any light, if the white is represented in pure white and the black in pure black, and viewed in the same light which illuminates the subject, then the representation gamut is exhausted, and what becomes of the shadows ? If they are to be represented, obviously the black must be transcribed to a lighter tone. The white may show a glitter, a portion may reflect more light than the even tone. The white must then also be transcribed in the representation below white.

Again, if sunlight be introduced the modification of tones becomes still flatter, how flat depends on the key in which the representation is made.

These considerations show that the photographic modifications in the steepness of negatives which affect the vigour or softness in black-and-white prints play a large part in the ultimate effects shown in tricolour prints.

The steepness of each negative of the three should be correlative to the other two, not necessarily the same steepness, but each should be just so steep that it shows the right relative proportion of each colour, both in lights and shadows, whatever the scale of tones the print may be in.



TAILPIECE DESIGN.

VAUS & CRAMPTON, LTD. By ERNEST W. JACKSON.

The Artists' Department.

By HAZLITT & GILMOUR.

Gilchrist Bros.

Photograph by J. B. Sablick.

So much has been written on the subject of photo-engraving, and the technic of the working is now so familiar to workers that it seems a waste of time to rehearse, even when one embellishes it with a new dress. It would also be futile to make the statement that many are employed at the work whose talents should have been employed in other directions, because the statement, while true, leaves the fact as it is and as it probably will be for some time to come. All that the technical schools can do will not prevent irresponsible process houses from employing makeshift labour from the ranks of the "cheap unemployed." The matter or manner of taking on apprentices is a fruitful source of evil, and leads me directly to my subject—this taking on of apprentices is generally done as though all boys were suitable for the work, which is as untrue as to say that all boys are of one temperament. The boy himself is seldom consulted, or if he is it is in a perfunctory manner, and his reply, which is always "yes," is accepted as having decided the matter, whereas the employer should discover the peculiarities and fitness of the lad by talking to him without the presence of a third party, as this plan will invite his confidence. If he does not then see the fitness or unfitness of the lad he is not himself fit to undertake the vitally important function of choosing the future life work of another human being. The evil often done in this matter is most regrettable, at least to any well-balanced mind.

Another feature of the apprentice question is the erudition of the applicant, and it should be remembered that, as it requires intelligence to become a good photo-engraver, he is—as an intelligent lad—entitled to expect to rise to eminence and honour in this as he might in other lines of business, and the best is at the very top of the tree. This is where he will meet those who have risen in other lines of business. This is where he should realize the rewards of perseverance and industry which will take him out of the narrow rut of the ordinary workman—the top of the tree—where all other avocations converge. We may liken the journey to the top to Shakespeare's seven ages—first the apprentice——breaking and spilling to the journeyman's alarm—then comes the sage, who knows everything. We will omit several stages here and we arrive at the journeyman whose experience has taught him that much knowledge is vanity and that nothing is final here below nor yet in the gallery on the top loft.

The artists' department in the process house should include every department of the work, therefore each apprentice should have the artistic temperament, else we have the "operator" who does not properly appreciate the importance of the more delicate tones. The process printer's eye should readily discover the difference—if any—between the print and the original in amount of general colour. In the etcher we have—if not an artist—a serious obstacle to correct rendering of the original. Not that he may originate, but that he may interpret correctly. That he may reproduce the original picture, also that he may under-

stand as an artist would that he is not to "improve" upon it—as a customer—particularly if he be a good-class publisher—may appreciate a *real* improvement which has not been requested, but it will not inspire his confidence for future subjects which he may want reproduced.

The tendency to "improve" by etchers is nearly always the result of ignorance and reminds us of the old adage about fools and angels.

An artist etcher seldom tries to improve on the original.

The same remarks apply to the engraver, though the term "engraver" in the process trade applies so often to workers who are not, correctly speaking, engravers, but simply spotters, outliners and trimmers.

Wood engravers, who were formerly pictorial men but who now adapt themselves to process work may—and often do—add much to the plate by giving character to the foreground and bolder parts of the picture. I might also add they often do work intended for this purpose which would be much better left undone. In reviewing the several departments of the work, one almost hesitates to say which is the most important.

In the matter of proving, the customer would naturally say, "If you have made a good plate why bother about a good prover." It will always be found that the best workers in this department of the work do the least make-ready, and are simplest and quickest at their work, while the inexperienced seem to take it for granted that a plate will not give a good result unless he has spent a certain and considerable amount of time over it, with the result that the proof looks "lumpy" and slurred and you find on examination that the plate is rocking on little hillocks of make-ready. The amount of ink for a given plate? This requires good judgment, and the artist prover *is* an important factor in the work. Nor does the art department end here, in fact it only ends this side the office door, unless one may include making out the invoice, which, however, is an art outside the province of this article.

The blocker or mounter, as he is called, now has his innings—for better or for worse—and his artistic, or inartistic, sense when applied to a vignetted plate or in the case of cut-out figures, sometimes causes an originally graceful or comfortable pose to assume an attitude suggestive of a sudden and painful spasm.

There is a pun here somewhere, though I have not yet thought it out—it has to do with blocking and blockheads. Of course, if he is the latter he will not trouble to look at the original in order to get the pose, as he knows a simple thing like that without bothering, whereas if he is something of the artist, "he wadna jist like to say," without looking it up.

THE GRIMY THAMES.

GILCHRIST BROS.

Photograph by
J. B. SABLICK.

HANSEL AND GRETEL

Three-Color Blocks by
The Zeese-Wilkinson Co.
New York

Wallage & Gilbett, Ltd.

Photo by E. O. Hoppé.

A Portrait Study.

The Strand Engraving Co., Ltd.,

"STRANTONE"

A Cat Study.

The Strand Engraving Co., Ltd.

From a Water-colour by Miss E. A. Cubitt

"STRANCOLOR"

A Garden Scene.

LASCELLES & CO.

By FRANK W. ADAMS.

T. B. BROWNE, LTD.

Initial Design by
FRANK W. ADAMS.

HE photographic processes being so closely allied to the printing business, a few remarks concerning photography, and some of its uses in connection with printing, may be acceptable to members of the "Art Preservative."

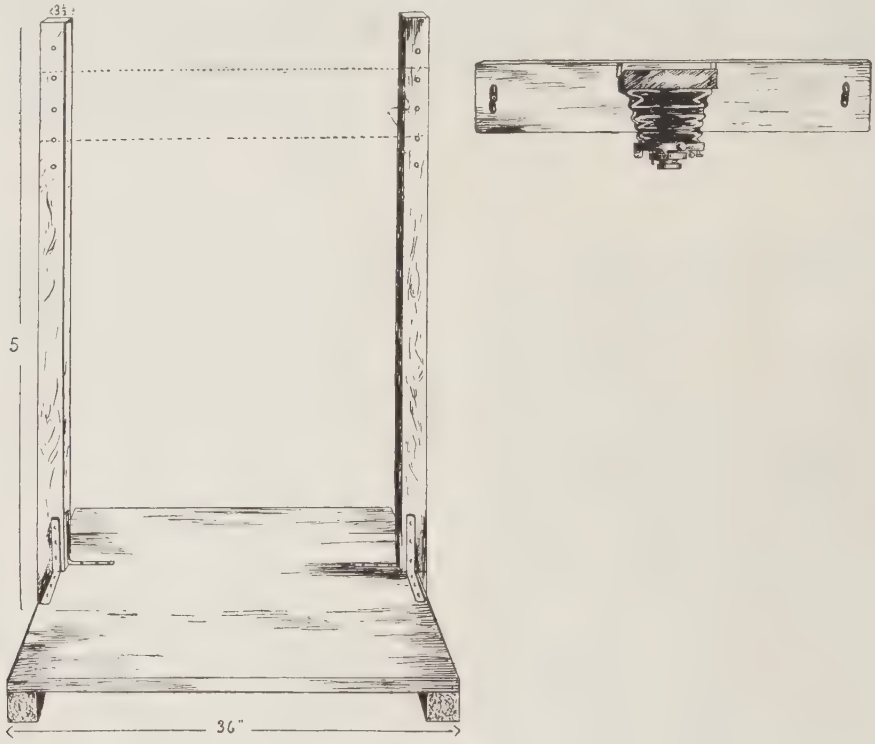
I do not pretend in any way to teach the principles of photography; even if I were able so to do, I am afraid that the necessary space required for such a preachment would occupy a volume as thick as the *Year Book*. Do not gather from this remark, however, that photography is too complex for the average typo. Oh, dear no! Although there are a thousand and one points treated in bulky volumes concerning the art, it is not necessary to "struggle" with all that has been said or done in respect thereto to become an average amateur. Briefly, a short study of the subject, every care taken in the various manipulations, the right plates and the right developers, and the exercise of ordinary "gump" should warrant the printer adding the word "Photographic" to his memo. heading.

Although conscious that I may only be setting forth information that is already the knowledge of a good many printers, there must be a large number who, with a few guiding hints, would readily add to their existing business a

photographic department, and to these latter a little light on the subject may be interesting, and at the same time prove remunerative.

It is generally well known that the best half-tone blocks are made from good P.O.P. prints or glossy bromides, but often the printer has to deal with originals that have been printed on matt bromide or other unsuitable papers, which invariably give flat and "washy" effects in the half-tone plate. Much more satisfaction would be gained if the printer himself were able to undertake the photographing, the method of obtaining the original would then be under his own control.

Apart from the amount of business that could be negotiated for customers, there is a wide scope for unique effects to be gained from combination of type,



etc., by the means of photography. After the primary rudiments have been mastered, the newly initiated printer-photographer will find himself making originals for effective borders, panels, initials, etc., gaining effects impossible by other means, and enabling him to step in front of his less go-ahead competitor.

As one or two examples showing what effects may be gained by photographing ordinary type, attention is directed to the title piece and initial preceding this article, and also to the suggested title page. Similar effects to these could be produced *ad infinitum*; strong side shadows give admirably the effect of relief.

One essential piece of apparatus for the production of these effects is a special stand made on similar lines to the sketch above.

The base of this should be made large enough to take a royal sheet inside

the uprights with 3 or 4 inches margin on either side, and the sliding rail that takes the camera should be fitted with a thumb-screw bolt at either end corresponding to the holes in the uprights, enabling this slide to be raised either up or down. The method of attaching the camera to the slide is, of course, governed by the particular make used, as the baseboards in different patterns vary considerably. Almost needless to state, the uprights have to be placed in such a position that when the camera is on the slide, the aperture of the lens points directly to the centre of the baseboard. This enables type matter or floral subjects to be photographed on a flat surface, which, of course, is essential when dealing with loose type matter; and again, is by far the best method of photographing floral studies, etc. This stand can easily be made by any novice with a slight knowledge of carpentering, but extreme care should be taken that the uprights are quite vertical to the base. For strength and support iron brackets should be fixed from the base to the upright posts. Beyond this apparatus, and a fairly good photographic outfit, no other paraphernalia is necessary.

Lyth Engraving Co.

A dark cupboard or a corner can be found in most printing offices for the dark-room. The main point in building or making this room is to see that every ray of daylight is excluded. The dark-room lamp should be fitted with both yellow and red glass so that the same may be used for all ordinary plates, including orthochromatic, and that the red glass can be taken out and the yellow light used for bromide work. A stock of plates will be necessary, including extra rapid for quick out-door snap-shot work; ordinary plates (backed) for interiors and subjects requiring an average exposure, and process plates for copying and such subjects as require greater density. The camera in use by the writer is a half-plate Sanderson, which gives every possible movement required for a diversity of subjects, but any other similar pattern will, of course, answer the purpose. An enlarging camera, although not essential, will be found extremely useful. To point out a case in particular where an enlargement is necessary, attention is again directed to the illustrations

accompanying this article. A direct print from the negative where type has been used would, of course, print with the words the wrong way round, and this is remedied by placing the negative in the enlarging camera with the film nearest the light. Another point in favour of an enlarger is where a rather thin negative has to be dealt with. Greater density may be ensured by printing on a contrasty bromide paper through the enlarger.

Regarding exposures, certainly the safest and surest method is to be guided by an exposure meter, several of which are put on the market by reliable makers. This remark applying specially to outdoor work. Correct exposures for interiors and copying are only to be gauged by experience. A point that should not be lost sight of is that the light during an ordinary daytime varies considerably and due allowance must be made for these fluctuations.

Every amateur photographer has his own pet developer, but after giving a fair test to practically every standard formula, the writer has obtained the finest all-round results for general subjects with pyro-soda or pyro-ammonia made up exactly as given by the maker whose plates may be in use. Where a very active developer is required for snap-shot work that is presumably under-exposed, one of the developers recommended for this class of work is to be preferred.

When photographing type for any purpose, be careful to choose letters that are "unbattered" or dirty. In cases where extreme contrast is desired the face of the type may be rolled up with book-cover white ink. The wood type used in the illustrated heading to this article was treated in that manner.

A great many printers now publish their own view guide books, and in this direction the camera will be found extremely useful. The picture post-cards and sets of views obtainable from the professional photographer mainly give the stereotyped views taken from recognised standpoints, and here it is that the printer-photographer is able to get out of the rut by taking his own views, and choosing his own particular subjects. With a good eye for pictorial effect, pictures may be obtained that combine artistic qualities and yet give a good idea of the particular spot photographed. The view thus selected, judiciously mounted on multiple paper mounts of neutral yet harmonising shades, with instructions to the block maker to include the mount in the finished block, give results that are extremely pleasing.

It would be surprising to many printers the amount of profit that can be made out of this, may I say "side line," to the printing business. There are still a large number of people who are ready to expend their cash on "pictures," and when a client is pleased with a small print it is no rare thing for him to order an enlargement, and the up-to-date printer who has installed a photographic plant will find that his expenses are soon covered and a good margin of profit shown.

In conclusion, the writer is thoroughly aware that the amateur printer-photographer will come up against a lot of minor difficulties, but these may be easily overcome by reference to the many text-books which may be obtained bearing upon the particular subject wherein the difficulty is found.

Arthur Cox Illustrating Co., Ltd.

Photograph R. Haines.

Right Hon. Herbert Gladstone, M.P.

Comparative Quality of Printing Inks: Some Simple Tests.

Expeditious Test for Permanency—Making the most of Brilliant Colours—An Ink Maker's Rule—What is "Quality?"—Liliputian Patterns—Send Paper Samples—Some Delusions in Matching—How the Ink Buyer may act against his own interests—On Drying—The Black Ink Problem.

By A. W. MORRIS.

TINTERN ABBEY.

ARC ENGRAVING CO., LTD. Design by E. W. JACKSON.

THE purpose of this article is to offer, with every deference to the competent judgment of any readers, a few hints on how to tell the comparative values of inks.

Nearly thirty years' experience in the ink-making world has impressed on my mind that there is something very misleading and unsatisfactory in the method usually employed for making such comparisons, or, to speak more accurately, in the want of such methods. In writing these notes, however, I am very wishful it should be understood at the outset, that I have no desire to disparage the manufactures of any firm of inkmakers, nor the judgment of any selecting and buying printers. It would appear that there was real need for the diffusion of some clearer and more effective knowledge on the subject when one so frequently hears of the variation in prices of *apparently* similar inks. There is, however, usually no warrant for this; for generally the prices asked by different makers of inks under comparison exhibit very little variety *for the same constituents*, while the differences of quality which are supposed to be absent, become to a great extent obvious, once the samples are carefully and practically tested. I say "to a great extent" advisedly, because one of the chief factors—permanency—can really be only satisfactorily determined by actual exposure to light. There have been several kinds of apparatus invented by scientists interested in colour manufacture to obviate the necessity of exposure to sunlight in order to test the permanency of colours, but after thorough trial they have all proved unsatisfactory, and the perfect apparatus which will enable the permanency to be accurately determined at any time, in comparison with exposure to certain periods of sunlight, has yet to be invented. When it comes, it will be heartily welcomed by all who cater for the graphic arts. Meantime, we must make the best of existing circumstances, which, in a country blessed with but short summers, and more than its fair share of fogs, are varied and peculiar.

A permanency test.

The most expeditious method that I can recommend for obtaining a com-

parative permanency test of any doubtful colour is to take some ink considered to be permanent, *e.g.*, Madder Lake (by the way, a strict definition of the term "permanent" as applied to colour would be interesting) add to it ten times its own weight of zinc white ink, and a given quantity of varnish sufficient to reduce it to fair working consistency (the varnish may be measured in spoonfuls). Then reduce the doubtful ink in the same manner, print both and expose half of each print, comparing with the other halves at the end of each day. In the summer sunlight a fugitive colour thus treated will show a decided fading in twenty-four hours.

A possible cheaper and better.

It is well known that the most brilliant colours are generally the most fugitive, but for many purposes these may be used alone, or mixed with permanent colours to enhance the brilliancy of the latter. If the printer would in such cases state that permanency is not a consideration, it would assist the inkmaker and probably secure a cheaper and brighter ink. But this is seldom mentioned, and when it is not, the custom is to supply as permanent a colour as possible in the shade required.

What constitutes "Quality?"

Now with regard to the *quality* of ink. It must be borne in mind that this consists of several attributes, *viz.*, strength of colour, brilliancy, bulk, good working and drying properties, and, as before mentioned, permanency. Many inks also are required to be varnishable. Some must be acid-proof (by the way, the billposter who will use acids in his paste is often quite forgotten). Some inks must be alkali-proof. Some must be both alkali and acid-proof.

A too flattering customer.

Professor Owen, who is said to have reconstructed a monster of antiquity from one discovered fossil bone, would perhaps interpret better than the inkmaker some orders and enquiries which give an enormous credit to the recipient for ability to "tumble to" what is desired. One gets requests at times which set one thinking of Mr. Punch's "perfect servant," whom his young master at the Club directed to "hop over to the—you know—and tell what's his name?—that I'm sorry I haven't got that thingummy for him; then look up the train for er—er—you know the place, and find out if he can come there with me this afternoon and bring that other chap too, you know." "Exit servant, perfectly understanding," says "Punch." "Punch" might pass on the compliment to many a printer, no doubt, and I think to some inkmakers. The servant was civil, and so are we; though we should like some times to have some ambiguities resolved.

And when it is a case of matching one would like really to have something to match, and not to be restricted to a very diminutive pattern as one sometimes is, without any intimation either as to the class of work for which it is intended. The sample and quotation are usually required "by return," so the inkmaker is compelled to use his best unaided judgment under the circumstances, and I cannot claim that the judgment of an inkmaker is infallible. I would impress upon the printer the necessity of furnishing as much information as possible with his enquiry.

"Not like in like, but like in difference."

The actual *colour* of an ink may sometimes be matched, or so nearly that the difference is hardly perceptible, in several qualities, but each may possess a good feature lacking in the others and be of good value at the price quoted.

For letterpress printing it should always be stated whether the ink is required for printing from process blocks, and in every case a sample of the paper to be printed upon should be included.

Bulk and density of Reds.

The colours which require the most careful testing to approximate their value are the low-priced reds, since the bases of these are so many and new dyes are consantly being discovered. The old lead base reds have now almost gone out of vogue, as they were very heavy and had a tendency to " deposit " ; but the leadless colours which have taken their place have seldom the same density of colour, although they are brighter and much more bulky. These reds, with just a little lead colour in them give a good solid impression. So little of the lead colour may be used as to make the difference in bulk barely appreciable. But the inkmaker is often debarred from supplying such an ink, the printer stipulating that it shall " be free from lead." Of course, for alkali-proof inks and some other purposes this stipulation is necessary, but when made simply to ensure getting a bulky ink, it is not always well advised.

How to compare strength of Colour.

The method of comparing the bulk of inks is obvious. The bulk having been noted the next thing is to ascertain the comparative strength of colour. This may best be done by reducing with zinc white, as suggested in another part of this article for testing permanency. The usual practice of dabbing out the colour is not a proper test, as one cannot be sure of rubbing it out evenly, and when at full strength any difference may not be perceptible. Do not use flake white for reduction tests, as the lead contained in this is subject to oxidation.

To test drying.

The drying property of an ink is best ascertained by reducing to working consistency, spreading thinly or pulling a proof on the paper to be used and allowing to stand exposed to the air. This advice may seem superfluous, but I mention it because I have known instances where inks have been condemned as too slow or quick drying according to the film on the ink's surface in the tin, irrespective of the time that the ink has been kept before examination, or whether it has been kept covered or uncovered.

No quick test for working, but an indication.

The working properties of ink can, of course, only be thoroughly tested by practical trial, but those inks which have a smooth velvety appearance when spread on paper, and have not too much or too little " tack " when tried between the finger and thumb, will generally be found to work well, although they may possibly need manipulation for certain papers.

In black inks there will probably be found more difference than in colours, but in this case it is mostly a difference of density, brilliancy, working and drying properties, and the only real criterion of their value is that of practical use. It may surprise many printers when I state that there are more valuable secrets in the *method* of manufacture of really good black inks than of any coloured inks. This is the reason why there is such a difference in the quality of black inks supplied by different inkmakers. The ingredients used may be the same, or almost the same, but the results are known to vary very considerably. There is plenty of chance for differentiation. The making of a new fine black ink is often a long and slow elaboration. We were engaged with our works chemist for fully six months developing the new " M. & B." process blacks to our satisfaction.

With printing inks, as with most other commodities, the best is the cheapest in the end. The inkmaker, of course, must supply exactly what his customer requires, but in these days of strenuous competition, and the rage for cheapness, it cannot be too well understood that price alone is no criterion of the value, contained in a tin of printing ink. There are, and always will be, differences in the prices of different makers, according to difference in cost of production, or of the profit each is satisfied with. If, however, our friends, the printers, will take the trouble to make a careful comparison of values offered they will possibly find a large difference between the best and worst, but not any extraordinary variation between the others. Then, choose the best !

THE LIVE "TEDDY."

THE ACME TONE ENGRAVING CO., LTD.

Photograph by MONTAGU REDKNAP.

The Photochrom Co., Ltd. *Inks by E. N. Frankenstein & Co.*

A Strawberry Root.

This mount is 'Salon' Drab Paper supplied by F. Keay & Co.

Half-Tone Engraving Co., Ltd.

Photograph by Elwin Neame.

Miss Zena Dare.

The Strand Engraving Co., Ltd.

By kind permission of Messrs. Hasket & Co.

"STRANTONE"

A Cathedral Interior.

Byland Abbey. Central Doorway, West Front.

Glastonbury Abbey, Interior,
St. Joseph's Chapel.

Rievaulx Abbey, North Choir Aisle.

Rievaulx Abbey.

Clastonbury Abbey, South Doorway.

Glastonbury Abbey.

Al Engraving Co.

Photographs by Godfrey Bingley.

English Church Architecture.

Press Etching Co., Ltd.

Photograph by Elwin Neame.

The Outdoor Girl.

By courtesy of Dr. Jaeger's Co., Ltd.

Arc Engraving Co., Ltd.

Photograph by Elwin Neame.

Miss Maudi Darrell.

The Grout Engraving Co,

Rural England.

"Swantype." The Swan Electric Engraving Co., Ltd.

Ulysses deriding Polyphemus.

From the picture in the National Gallery, by J. M. W. Turner, R.A.

W. & G. Baird, Ltd.

Photograph by Elwin Neame.

Sorrow.

W. F. Sedgwick, Ltd.

Photograph by Elwin Neame.

Miss Evelyn Millard.

Acme Tone Engraving Co., Ltd. Design by Chas. E. Dawson.

THE perfection and (alas !) cheapening of the process block, is responsible for an entirely new phase of press work, a phase that made its appearance with the rise of the half-tone and the decline of wood-engraving.

Eliminate the process block, and you knock the stuffing right out of ninety per cent. of modern journalism.

Scenery, diagrams and even portraits were depicted in the old pre-process days, but the portrait, as we now know it, did not bulk to anything like its present proportions. It has been left to the process block and the twentieth century to develop the show girl as a pictorial feature in periodicals.

There are about twenty well-known illustrated papers, weekly and monthly, not counting dailies, published in London, and at least a dozen out of these twenty depend upon the show girl and pictures of popular players for their circulation.

An impartial critic, surveying a modern bookstall for the first time, might well conclude that the Press Agent has us in his grip, and that we are becoming not merely a newspaper, but also a stage-ridden nation.

The King visits as many theatres as his busy working-hours permit, and society gregariously follows suit. The idolatry of the actress is a craze which thrives on what it feeds upon, hence the omnipotence of the pictured show girl.

The doctrine of him-who-must-be-obeyed in the Carmelite bunch of journals has ever been the popular "Give the public what it wants," and this policy that sacrifices everything, including sense of proportion and self-respect, is creeping over the face of the papers, like some baleful blight. It's an ill-wind that flutters the pages of the press to-day, but photographers and process men, and even show girls, must trim their sails to catch a little of the breeze.

The first great wave of "show-girlitis" struck London when the "Belle of New York" made her first appearance many years ago. Portraits of Miss Edna May and the boatload of imported beauties who came with her, broke all British records for their perennial and persistent appearance. The peculiar mannerisms and dress of Miss May, owing to her extraordinary publicity, created an influence on Society, which, filtering downwards, is still traceable in the garb of the lower middle classes.

The average photographer had it all his own way in the theatrical branch of press work until three years ago, when signs of improvement in the work reproduced was noticeable.

At first, a few of the theatre-ridden papers broke out into whole-page portraits, which betrayed conscious efforts at artistic effect. Accurate rendering of modistes' confections, corset makers' triumphs, and tailor-made suits gave place to diaphanous drapery that had evidently been manipulated with an eye

to composition. The mechanical "Odol" smile of the front row musical comedy chorus lady was superseded by a less acrobatic and slightly pensive expression.

One paper after another began to print these new-style pictures of stage stars in the making, until the "pretty girl" portraits strayed from the limits of the few papers that had hitherto specialized in this department and bobbed up as covers, whole pages, headings, tailpieces, etc., in the most unexpected magazines.

After a while, those in the business began to recognise these prints as something different, to watch out for them and the modest signature underneath—the then unfamiliar name of Elwin Neame.

Neame's advent, though swift, was silent. A new novelist of equal ability would have been interviewed and written up till his name became like a new soap—a household word. But the British public, and to a less extent, the Press, care little for any Art that isn't "done in oils" and put in a gold frame. The Graphic Arts might go to blazes for all they care, so long as the Royal Academy and its understudy, the coloured supplement, be left them.

But the leading amateur photographers, and all those who really know the difference between one print and another, have already marked Neame down as a man to be reckoned with. In fact, the only photographer of any achievement who doesn't place him in the front ranks of our British camera-men, is Neame himself.

He had been showering show girls and actresses over the illustrated papers for a year, when the ubiquitous "Daily Mirror" broke away from its rivals and started the Beauty Competition craze. A prize of £100 was offered. I'm not sure if there wasn't a motor car thrown in—a mere trifle with those merry "Mirror" men. The well-known artists who were to judge this competition were nearly snowed under the avalanche of portraits sent in by thousands of modest damsels, each convinced that they were "it."

Bold, brave Editor Kenealy had announced his determination to discover the most beautiful woman in the world, and it looked as though chasing the nimble needle through the proverbial haystack would, by comparison, be an easy game.

Neame was instructed to make portraits of the most promising entrants selected by the committee. From the moment his photographs were seen, there was no longer any doubt as to the winner, and the now famous Miss Ivy Close romped home an easy first. Over a million reproductions of her portrait were sold in Great Britain as picture post-cards, photogravures, etc., and nearly as many were absorbed by the Continental trade. Arthur Hacker, A.R.A., was commissioned to paint the fortunate young lady's portrait, and as it was within ten days of the sending in date, his Academy picture of the year was a *tour de force* for him, Miss Close and all concerned.

Since then Neame has been one of the busiest photographers in London; not only show girls, but the big stars of the theatrical constellation, with a mingling of society women, keep him working night and day—and the end is not yet!

The photographic societies hung his work in their Exhibitions, until they arrived at the quaint conclusion that it was too popular to be artistic.

Neame became a success at an age when most men are still serving their apprenticeship. Even now, it is not unusual for sitters to say: "But I want Mr. Neame to photograph me, himself." "I am Elwin Neame," he protests, whereupon they say: "Oh, I am so sorry, I thought you were the boy!" As a matter of fact, Neame to-day is twenty-three, but the trouble is, that he doesn't look it.

Like others who had watched his work develop and had some idea of his

tremendous output, I used to imagine him to be a middle-aged man with a good head for business, and it was not until I moved into my studio at Baron's Court—the Voysey building formerly occupied by Thomas R. Dallmeyer of the Dallmeyer Lens—that I got to know Neame, and discovered how amazingly young he was.

His studio was opposite the little old house occupied by Sir Philip Burne Jones, and Neame was then already making his pile—of negatives. Every room of his house was crammed with twelve by ten plates (he doesn't handle smaller sizes) and each one bore the presentment of some more or less alluring bit of femininity.

He has recently pitched his tent in the more exclusive and ultra select district of South Kensington, with, I suspect, at least half an eye on the débutantes and Court dresses of the Smart Set. I doubt, however, if he will find better models than the Aldwych and Gaiety girls who rolled up to Baron's Court in their motors in such delightful profusion.

Neame was at the Bristol School of Art at the age of twelve, and after studying for four years, and winning the medal for black and white, he distressed the professors by forsaking the brush for the camera. After doing odd jobs for the local photographer—some more odd than others, I gathered—he scored his first success on his own account. Miss Zena Dare, the picture post-card and musical-comedy Queen, was starring in Bristol, and Neame, after many attempts, induced her to give him a sitting. Fortunately the fair Zena liked the picture, and when it was published, a West-End firm offered and engaged our young friend as an operator at a salary which in those days seemed princely. After learning the tricks of the trade, and not a little of the temperament (and temper) of lovely woman, he started á studio on his own account. He decided to specialize, with the Eternal Feminine as his theme. His friends among the old-established photographers assured him that to restrict himself to one branch of work would be courting failure. He must be ready to perpetrate wedding groups, pet-dogs, babies, and even aldermen in robes and side whiskers, in fact, as he says, " To be prepared for the worst." But he prepared only for the best—and succeeded.

The artist's duty, Neame claims, is not to portray the sitter realistically (often only another word for awkwardly), but to render her charms as gracefully as possible, and in one of the rare moments when she is looking her best. The chief qualities essential to success are tact, technical skill and artistic perception. Without a good stock of these, especially the former, the professional photographer may as well go to the dogs, the babies, and the aldermen afore-mentioned.

Some philosopher—a suffragist may be—has said that " the way to a man's heart is through his stomach," but Neame declares that the way to a woman's *amour-propre* is through her hat ! And it is with his hat trick, that Neame inspires in the sitter that one expression, coy, pensive, scornful or ecstatic, that reveals the fullest measure of her beauty. In his studio are large cardboard-boxes, bearing the name of an expensive milliner, and in each reposes one of the very latest and most alluring creations. When the sitter begins to look bored, stiff and wooden, Neame opens one of the boxes, and produces a hat with the suggestion that the fair victim " might like to try it on." Instantly, the dull sitter is transformed into a radiant, happy being. Her face wreathed in smiles and the latest thing in hats, she yields a series of more entrancing pictures than any other means could have produced. Neame's working outfit consists mainly of an armful of chiffon and a mouthful of pins. He starts at one end of the drapery, and winds it around the model, at each winding, a sort of half-turn, half-flick, makes it fall loosely and gracefully into just the folds he wants. In about fifteen seconds

the sitter is as securely enveloped (in chiffon and pins) as any butterfly trapped by cunning spider, and head, bust, and hands are posed to fulfil exactly the lighting and composition requirements of the preconceived picture.

His technical methods do not differ much from those of other leading professionals, but his results are new and pleasing. He has learned much in modelling and drapery from Greuze, Correggio and Cosway, but he has evolved a certain style of his own. He delights in beauty of line and texture, in finely flowing diaphanous drapery, and if his love for superficial prettiness is at present all-absorbing, why, that is his concern. He doesn't claim to be a portraitist, his aim is primarily to make a pleasing picture, and if it should happen to resemble the sitter—so much the better !

He is a cheerful young faker, and what " Farmer's Reducer," hypos, and ferrocyanide of potash won't do on a negative, can be accomplished by varnish, knife and pencil. He never loses any sleep worrying over the " Art for Art's sake " theory, but is as content to exhibit his work on calendars, showcards, and in the leading papers, as the fuzzy-wuzzy artists are to show theirs in the salons of the elect. His big glossy silver-prints are always a joy to process men, and it is to their aims and needs that he gives his closest study.

The portrait of Miss Evelyn Millard illustrates his skill with drapery, and is, incidentally, an excellent likeness of the well-known actress. Miss Maudi Darrell expounds his " hat trick," and also the mirror effect he often exploits.

The Misses Ivy Close and Zena Dare are characteristic examples, and in his " Miss Gertrude Robins " he shows signs of departure from his well-worked " draped head " formula, and presents us with a straight portrait in which the difficult tone values of fair hair are cleverly maintained against a light background.

The youngest and one of the most successful photographers in London, Elwin Neame is gradually evolving a sense of character as well as beauty. He is quite unspoiled by good fortune, and when he wearies of his present vogue, as he is bound to do, we may look for great things from him in other branches. Anyway, he has his future well before him, and his achievements so far are remarkable.

Acme Tone Engraving Co., Ltd. Design by Chas. E. Dawson.

Hill & Co.

Photograph by Elwin Neame.

Miss Lilian Ivy Close.

T. B. Browne, Ltd.

Photographs by Reinhold Thiele.

Up-River Scenes on the Thames.

Glasgow Photo Engraving Co.

Photograph by J. V. Sablick.

At Sea and Ashore.

The Art Reproduction Co., Ltd.

Photograph by Elwin Neame.

"BOBBINS."

A Portrait Study.

The Art Reproduction Co., Ltd.

Photograph by Elwin Neame

Gertrude Robins,

Dramatist.

Forging Razor Blades.

Silver Plate Worker, Chasing.

Silver Plate Worker, Raising Edges.

Silver Plate Worker, Flat Hammering.

Silver Plate Worker, Brazing.

Pawson & Brailsford.

Photographs by Pawson & Brailsford.

Sheffield Industries.

Electric City Engraving Co.

A Half-tone View showing the decorative effect of a Vignette.

Entwistle, Thorpe & Co.

Photograph by Elwin Neame.
Negative on a "Graphic" Process Plate.

Memories.

Arc Engraving Co., Ltd.

Inks by A. B. Fleming & Co., Ltd

The Young Fisher.

Photo-Mechanical Colour Printing v. Chromo-Lithography.

By C. G. ZANDER, F.R.P.S.

Miss Mab Paul.

Pawson and Brailsford. Photograph by Reinhold Thiele.

MOST printers are under the impression that photo-mechanical colour-printing is necessarily confined to three-colour work. Such, however, is not the case. It is true that nearly all letterpress colour-printing is done in three-colour half-tone work, which has so well established itself throughout the world mainly owing to its cheapness. When, however, the latter is not a prime consideration, and when correct and artistic colour-rendering, free from any dominant colour-tone, is required chromo-lithography still holds its own.

The difference between the two processes as regards their relative pictorial effect lies chiefly in the fact that three-colour half-tone printing, owing to its photographic base, renders detail with minute faithfulness, especially in a variety of objects photographed direct from nature, in a manner such as even the most skilful and patient draughtsman could not possibly hope to achieve. It very seldom, however, renders the natural colours of the object in facsimile, particularly if the range of colours happens to be large and brilliant. Chromo-lithography on the other hand, is strong in the reproduction of colours, but in the rendering of detail it is limited by the skill of the lithographic artist.

It has often occurred to me that it ought to be possible, and it would be very desirable, to devise a process which would combine the advantages of both processes, *i.e.*, the rendering in facsimile of detail by means of the camera, combined with the range, depth and other artistic qualities (and let me add, the permanency) of colour reproduction of the highest grade of chromo-lithography, and that such a process might be worked either in letterpress or lithography.

As I have neither the time nor the facilities to work out such a process, I will just give my ideas, and must leave it to those who are specially interested in it and have the time and opportunity, to take these ideas as a basis and to work them out fully.

Most printers are satisfied that for commercial purposes, the best three-colour work produces very fair results, though a great deal of it, particularly such as displayed by the familiar seaside coloured pictorial post-card, is very poor stuff indeed. It is assumed that three is the smallest number of colours by mixture of which we can produce a picture which will fairly represent the original if not viewed by too great a critic—say, by the man in the street. Four properly selected and balanced colours, such as I have advocated in my four-colour process, produce a far better result. To attain to a perfect facsimile colour-rendering such as produced by chromo-lithography and in order to use perfectly light-proof colours, even four pigments are insufficient.

We must in the first place, by empirical methods, settle the question as to what is really the smallest number of permanent reproduction colours or pigments which will give the most complete range of colours. This accomplished, it is a comparatively simple matter to make filters, and to adapt the process to these reproduction colours, and to work it in letterpress or preferably in litho.

Let us briefly consider these pigments. Commencing with yellow, as there is no permanent pure green pigment, a greenish or sulphur-hued yellow is necessary for making good greens, especially for the reproduction of foliage. Such a greenish yellow will, however, be unsuitable for making good lemon yellows, orange or scarlet when a purple-red is superposed. For the latter purpose the use of a second yellow is imperative. This should be of a pure bright lemon, of approximately the wave length 5900, or pure chromate of lead. If such a yellow is used, the best red would be a good bright bluish madder, which is one of the fastest reds. There are many more suitable reds as far as their hue is concerned, pigments made of rhodamine, acid violet, etc., but they are not fast enough in light for good work. A good madder will, with a good lemon yellow, make a very fair orange or scarlet on the one side, but a very poor, dirty sky-blue, violet, or violet Blue, if the blue used is of the greenish or peacock hue generally used in three-colour work. The sky in a good three-colour landscape is invariably the *bête noire.* If we want good violets, good skies in landscapes, and at the same time good greens for foliage, it will be seen at once that two blues are required, one should be of a bright ultramarine hue, the other a greenish blue. Ultramarine is not suitable for half-tone work, but if the process is to be worked in litho, no more suitable pigment, on account of its permanency and purity of tone, could be found. For the second blue, the only permanent pigment which will give good results is Antwerp blue (the genuine article, not a worthless imitation). Although far removed from the correct hues, such as could easily be obtained by using a fugitive aniline pigment, it will make excellent greens with a greenish yellow, and has the advantage of great permanency in light.

With two yellows (lemon and primrose) one red, and two blues (ultramarine and green-blue), I venture to say that we should obtain as perfect a colour range as is possible with permanent pigments, and with five printings get results which would equal the finest chromo-lithography, combined with the photographic detail of three-colour work.

Just a word or two with regard to the filters.

Assuming that the best possible panchromatic plates, with fairly even sensitiveness along the whole of the spectrum far into the red, are used, the absorption of the reproduction colours should be ascertained, and the filters adjusted to them. This must be done with skill and judgment. We have divided the spectrum into five parts, including the extra-spectral purple, which latter constitutes our red reproduction colour as nearly as is possible with a permanent colour, and therefore the filters must be lighter than three-colour filters, so as to render the absorption narrower, as, of course, the absorption will be represented by the printing colour in the positive (block, litho-stone, or plate, as the case may be).

In a permanent pigment the printing red will be somewhat on the spectrum red side, the filters should be a light blue-green (about 5000). For the deep yellow printer, the filter should be a light blue (about 4700). For the greenish-yellow printer a light violet (end of spectrum). For the blue-green printer a light red-orange filter is required (about 6200), and for the ultramarine blue an orange-yellow (about 5800).

As I have mentioned before, I cannot give full working details, only rough ideas, as I have not the time to make the necessary experiments.

Wholesale Engraving.

By A. E. DENT.

A City Functionary.

Glasgow Photo Engraving Co. Photograph by W. T. Green.

HOW many process firms would refuse an order for blockmaking? And yet, under certain circumstances, it is policy of the best sort to do so if the trade is to exist as a respectable and self-reliant institution.

Travellers are greater offenders than masters in many instances, for they will tell you they are not out for their health, and if an order is offered they take it (short-sighted creatures), no matter from whom; therefore, it behoves the employer, if he would keep his business sound, to keep an eye upon the sources of his trade.

Engravers complain that prices are cut to nothing, and yet how few will think sufficiently to see that the remedy lies in their own hands and nowhere else. The printer (our natural source of trade) cares nothing to handle engraving orders, for the blockmaker advertises his nett prices to the world at large and leaves no margin for the printer's trouble. If a draper, a cash chemist or a haberdasher comes along with a few photos for reproduction the engraver snaps the order, invoices at nett prices (as advertised, etc.), and then the inevitable aftermath. The printer, naturally incensed at finding his customer buying blocks direct, takes a minimum of interest in printing the job, and if remonstrated with probably slangs the blocks. This is retailed to the engraver, who retaliates by abusing the printer what time the user suffers, so nobody is satisfied.

All this might be smoothed out and made as sweet as first love if engravers would keep their trade in legitimate channels.

Some might say it is sufficient to charge a higher price to the first-hand customer, but that is a fallacy, for it not only robs the printer of one of his legitimate returns for technical knowledge, but alienates him and fails to do away with the inevitable friction aforementioned.

Then again, from an economical aspect, the printer can afford to canvass the first-hand trade because he makes his profit on the printing.

No engraving house could possibly canvass direct for all its work as the cost would be prohibitive, so some of them adopt that policy which has done so much to lower prices, and which has persuaded large printers to lay down their own engraving plant, *viz.*, the policy of picking out only the fat retailers and serving them at trade rates, leaving the printers the small and less remunerative ones.

So long as these unbusinesslike methods prevail, so long will the printer fail

to support the engraver. Should an enquiry come along from anyone outside the printing and publishing trade, it is not only the engraver's bounden duty but his most economic policy to answer it as follows :—

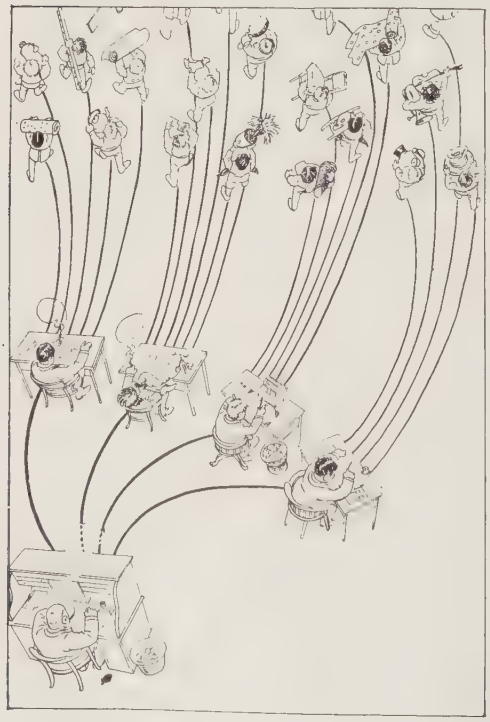
To Messrs. Sneakbehind,
Wholesale Drapers, etc., Hull.

Gentlemen,—We are obliged for your kind enquiry for prices, etc., of our goods, but as we deal exclusively with the printing trade, we must refer you to Messrs. Careful & Smart, Art Printers, 22, Prospect Lane, Hull, from whom our reproductions can be obtained and who will give you all advices personally.—Thanking you, etc.

By this means you save endless correspondence, eliminate difficulties which are bound to arise through the draper's want of technical knowledge, and you cultivate the printer's confidence, who is, above all, in a position to give continuous work. Moreover, knowing a good block he is more willing to pay a decent price than have trouble with his printing.

What the engraving trade requires is friendly agreement of all firms, large or small, preferably by means of the recently formed Association. A standard scale of prices which will allow a legitimate discount—to be private as between engraver and printer—such as, for instance, is done by the wholesale jewellers, silversmiths, brassfitters and other established trades, and a tacit understanding, honourably adhered to by everyone, of the fatality of going behind the printer's back.

By this means the process engraver retains his correct status of wholesaler to the printing trade, and instead of a " catch as catch can " scheme of gain by chance, he establishes a progressive policy of perpetual profit.



Ye Wise Engraver.

Ye Fool Engraver.

De Reproductie Compagnie.

Winter

The Artistic Side of our Profession.

By LEO HAGEDOORN.

INITIAL DESIGN.

By E. W. JACKSON.
VAUS & CRAMPTON, LTD.

WHEN we graphic workers, taking the necessary interest in our trade, survey in an unprejudiced way the finished products of our labour, then we must regretfully admit that the latest inventions and improvements in the photo-mechanical processes in general have contributed but moderately to the advancement of the artistic appearance of the reproductions.

At any rate this side of the trade has not kept pace with the enormous progress that is to be noted in the technique. Here, however, we are much indebted to the men of science, whose chemical formulæ and ingenious discoveries have simplified our work considerably, and have greatly increased the output.

While acknowledging the amount of good that has been brought about in this direction, it must still be borne in mind that not only the essential part must be looked for in the technique, but also that the harmonious development and effectual promotion of the taste and artistic sense of the executors is every bit as necessary a factor.

If we do not take the illustrated technical periodicals as a basis—where from their very object specially executed or selected specimens are given — but the standard daily occurring orders, then it is noticeable how comparatively little of this work comes up to the just demands of art, taste and distinction. Let us take, for instance, the great numbers of so-called "art supplements" in the numerous periodicals and magazines. How many of these really satisfy the obligation that is due to their pretentious name; how many repay the trouble of keeping?

Notwithstanding the fact that often very expensive materials are used, such as fine art-paper, the best quality printing-ink, blocks prepared with the greatest care, the whole makes no impression on one, it is quite expressionless. And add to this, just to name an instance, the engravings of Steinlen and Ballurian, as these were formerly issued by the Parisian "Gil Blas Illustré," printed on a common ragged piece of newspaper (in passing we should just like to mention that this paper after a comparatively short time takes beautifully warm yellow tints). On this paper, then, we see ordinary rotary-printing from simple line-blocks, with here and there a single little spot of colour, often not even correctly in register. And yet, what a delightful possession is a collection of these things—so cheap a while ago! How one beholds these pictures with ever-increasing enjoyment; not only have they something to tell you, but also remain with you and ever and anon persistently rise before your mind's eye.

How decided are the single, bright little pieces of colour; what a tone there is in these, seemingly so simple chalk-scrawls, partially filled in with a mechanical, but carefully chosen, film. Some of these "Gil Blas" engravings, recently to be seen framed on the walls of a graphic exhibition, really did not have to give way to some very costly photogravures.

To what are we indebted for these less expensive materials and such superior effect ?

In the first place, of course, the artistic quality in the drawing itself.

To this, however, must also be added the fact so favourable for the reproduction, that the artist made the original with a very thorough knowledge of the process at his disposal ; that he knew how to make the best of the peculiarities and properties connected with it.

The best proof of this certainly lies in the fact that proof-press copies of these same pictures, although on better paper and printed with better ink, do not show that same particular *cachet* as the circulation copies for which the originals were estimated.

Part of the success of this publication, so esteemed in artistic circles, may surely be attributed to the quality of the blocks employed in this case. He who was privileged to witness the reproducing of these pictures can appreciate this best.

The original drawing is executed solely in black, a sketched tracing roughly indicating the colours desired. It is left to the photo-engraver to " dress " the drawing in his reproduction. A task such as this is not a trifling one, for next to the necessary technical skill the executor must possess a well-developed sense of beauty, and a true understanding of what the artist wanted.

Another publication, which has succeeded in giving real " art supplements " is the American *Century Magazine*. The large circulation of this periodical is a proof that the masterly wood-engravings of Timothy Cole are sufficiently known.

What splendid reproductions in colour might be made in co-operation with an artist of his capacity !

Would not the monotony and often annoying " machinality " in the ordinary colour-printing be effectively done away with in this manner ?

The greater cost might be an impediment to commercial work in small quantities ; for the greater periodicals, this cost, divided over the enormous circulation, can make no difference per copy. Moreover, a number which is not thrown away immediately after being read, but is kept with care, has also more value and can be sold a little dearer if need be.

In general, customers are growing tired, especially of the illustrations in more expensive publications and *éditions-de-luxe*, of these ever-recurring effects of technical accuracy, but also so very cheap and machine-made reproductions.

In the various engraving departments they often work too much on the same principle, continually imitating, taking mechanically the most insignificant tricks from one another and repeating them over and over again.

Till quite recently were not all frames around pictures, friezes, tail-pieces and other decorations over-burdened with the so-called " edellinien ? " As if a deluge of vermicelli and macaroni had taken place in the graphic world, these queer motives had curled themselves over all kinds of printed matter. As a reaction to this we got the now prevailing epidemic of square blocks and straight lines. The end of this is not yet in sight.

We do not know who first hit upon the idea of composing a rose in such a way that it could be indicated by a circle and three or four straight lines, but it is certain that this idea also was imitated with every possible, yet cheap, variation.

So also the custom of placing machines on a slippery, unreally beautiful tile-floor. If need be, look at the hundreds of machine catalogues from every corner of the earth where photo-engraving firms have established themselves,

associated with the " air-brush artists "—and where is this not the case ! From all will the freshly polished tile-floor shine at you in the face, and seem made nearly all with the same stencil.

Machine builders of repute have assured me that they think that the whole category of " retouched machines," done in that way, are absurd ; that such tame illustrations bear no resemblance to their stable constructions of iron and steel. However, they order them just the same, only because their competitors do so ! This is probably the reason why the innovations, the oddities, spread themselves so quickly, which only come into vogue through their uncommonness and nothing more.

Though one may attribute to the engravers a clever power of adaptation, it is certainly not a proof of originality and initiative.

Another less worthy attribute of our branch is the too-ready adoption of new, especially quick, methods of work. It would be a very misplaced conservatism to agitate against this, when, with the innovations, an improvement, or at least equivalent results, were to be obtained at the same time. That this is not always the case appears from the present recurring reproductions in book-printing from old intaglio-engravings. If we compare the present reproductions with similar ones, when bitumen-printing was still in vogue, then decidedly the best qualities must be awarded to the bitumen process, already old-fashioned as it is now.

The French *édition-de-luxe* " Napoleon," published by Messrs. Didot et Cie. in 1888—probably in every library of any importance—gives excellent instances on this point.

Just notice how the half-tones of the original engravings are reproduced in detail in these illustrations, how beautifully " open " the shadows are, and how soft the lights, probably obtained by a special bitumen grain. In these reproductions something that stands above the average of the present reproductions is reached, in spite of our perfected auxiliaries.

While appreciating all the good things that are produced in colour-printing, did not, for instance, Carl Hentschel, Ltd., give a beautiful example in the *édition-de-luxe* " Rip Van Winkle ? " Also in this sub-division of our trade it is acknowledged that much of the matter produced is not really to be considered as " decoration." Especially here, where the task is so much more difficult, the occasion to fail is great.

There is certainly a very peculiar connection between the different sub-divisions necessary to obtain a result favourable in all respects.

It is, indeed, not yet sufficient for the photographer to expose his plates for about the right time, for the etcher to stop out his colours according to the tint of the original, the printer to keep an even colour and to look after his register —there is ever so much more !

Before anything else an application far above the normal is necessary, an untiring, energetic striving to obtain the best possible results, an understanding and admiration of the originally given subject. It is only when each operator will and can take up his task in this way that there is a chance for a really graphic " work of art."

The expert reader will understand what is meant by this. The reproduction of a grey tone picture can be technically meritoriously executed ; the little touches of paint can be reproduced in a surprisingly correct manner ; all details are attended to according to the rules and traditions, while the really chief thing the " tone," the beautiful sombreness of the original is quite missing. There can be bright, as it were, light-producing parts in a drawing given as a model,

which, though just as red, yellow, or blue, yet in the reproduction exclude every idea of brightness and make one think of nothing more than clear spots of coloured ink.

Inversely the technique in reproduction can be faulty here and there, and yet there is something of greatness in the whole, which gave the art value to the original.

This really slight difference, comparatively, in each of the component plates, this feeling, that ought to animate every operator to turn out something good, stamps our profession as an art-trade in which art is no stranger. Just as the technical side found assistance from skilful scientists, so does the artistic side need the guidance of clever artists. Their advice, resting on a profound knowledge of the properties of the various processes, is of very great value.

And, indeed, we see what splendid results are obtained in other branches of industrial arts under such direction. We think of cabinet-making, metal-working, the production of glass and pottery, "batik"-work, etc. It is true that our profession gives less opportunity for individualism, though the fact that in reproducing, with all the related work, the artistic sense can be developed is proved directly by testing and comparing the pieces of work mutually.

Some technical schools and associations have exerted themselves in a praise-worthy manner to develop the workers in graphic trades by giving lectures and courses under the direction of well-known artists. They who took the initiative in this clearly saw that to raise the capacity of the worker is a great, if not first, necessity.

A hard, but therefore not yet unjust method to keep the standard of the workers as high as possible, is also to limit the various heterogeneous elements coming from other trades. This, of course, does not prevent men once taken up in our branch being offered all help and assistance so that they do not continue going about as inferior workers with the work of less value connected with it. And they who come over to us in great numbers from other trades must not imagine that favourable results can be obtained in the chemical-graphic branches without a proper period of study and training; also there is no single reason to suppose that, for instance, a lithographer, who is not very fortunate in seeing, analysing, and combining colours, would find all this done away with as a photo-engraver.

Still there is much to be obtained by constant will power and firm perseverance: the healthy spur to always give the best will also contribute to bring our work to its highest pitch. This as an aim already gives cause for satisfaction, as a means of permanency, if not improvement, in our economic position.

Waiting for Business.

Carl Hentschel, Ltd.

Photograph by K. F. Bishop.

J. Furnells.

Inks by A. B. Fleming & Co., Ltd.

Monastery of Montserrat, Catalonie, Spain.

Direct Colour Reproduction.

Lyth Engraving Co.

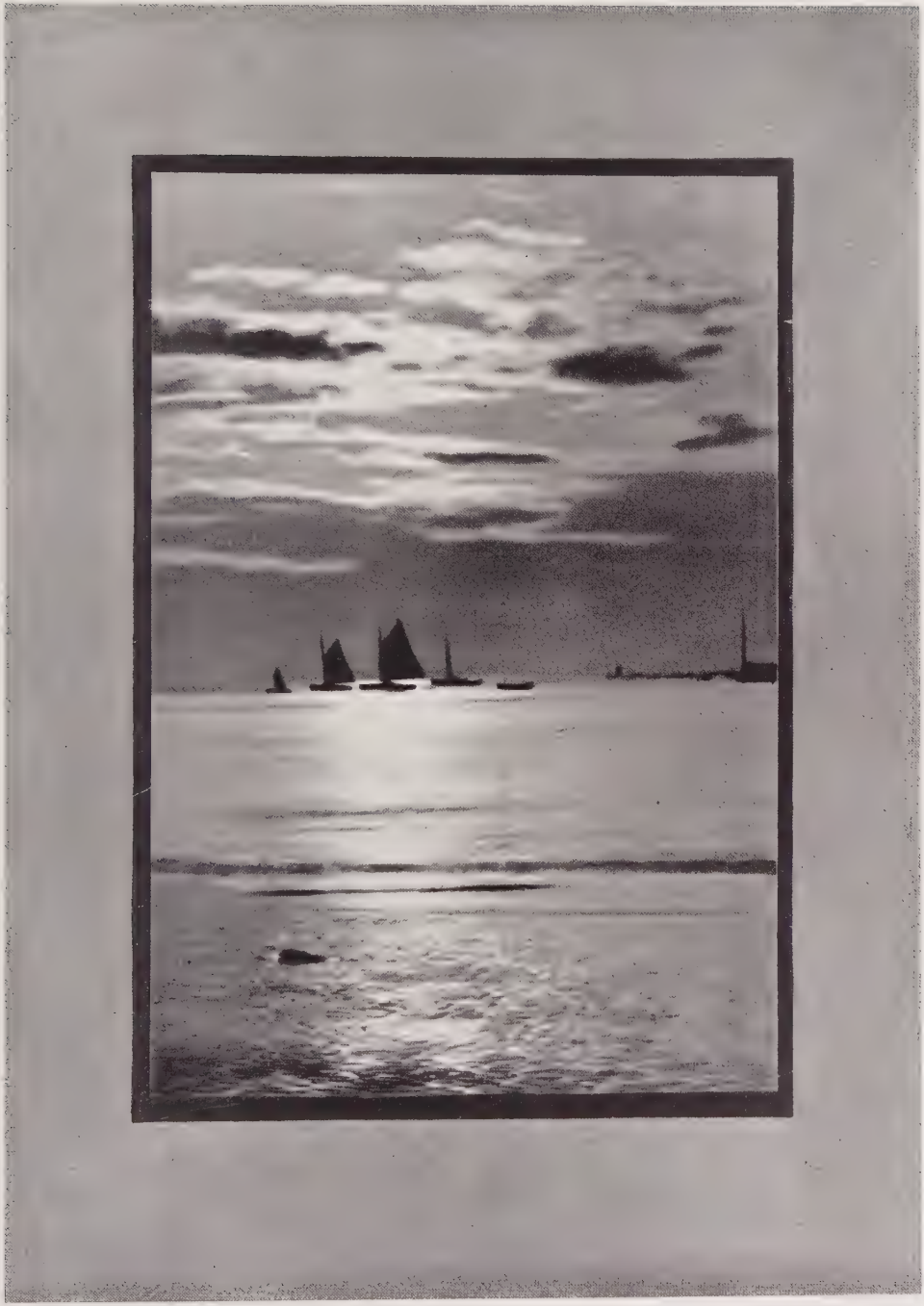
Photographs by Reinhold Thiele.

Life at Girton and Newnham Colleges.

Vaus & Crampton, Ltd.

Photograph by H. H. Connah.

Mont Blanc de Seilon, from near Arolla.



Gilchrist Bros.

Photograph by A. Bracewell.

Trawling by Night.

65 Line Screen. *"Daily Mirror" Studios.*

A Newspaper Half-Tone.

Compare with 120 line screen block on opposite page.

120 Screen. *"Daily Mirror" Studios.*

Miss Frances Dillon as "Lysabetta" in "The Proud Prince."

F. M. Haygarth, "Natal Mercury." *Photo by A. Allerston.*

Native Women at their Toilet in Zululand.

Philipson, Son & Skilleter.

Photograph by F. M. Ramell.

A Study in Black and White.

Western Mail, Ltd. *Photograph by R. Welch.*

Castlewellan.

Autochromy and Typography.

By HAROLD HOOD, F.R.P.S.

Bridge of Sighs, Venice.

Photograph by F. S. Earnshaw

Ai Engraving Co.

ONE thing which I venture to surmise has exceeded the expectations and hopes even of the inventors themselves must be the growing commercial application of the Autochrome process *via* three-colour blocks. Like all annihilators of distance the Autochrome must succeed on this count alone—that colour blocks, wonderfully faithful, can be made of subjects either remote or difficult of transit. Thus the Autochrome opens up new fields to the trichromatic process which were at one time deemed impossible. The engraver-Mahomet need not go to the mountain; by means of the Autochrome process a first-class mountain-in-miniature, in a well-preserved state of faithfulness, may be handed to Mahomet to be dealt with.

Take horticulture, for example, not only an enchanting and scientific pursuit, but one of great commercial importance. So far back, I believe, as eighty or ninety years ago more or less gorgeous results were achieved in colour applied to floral illustration, and the chromo-litho supplements of thirty years since of Sutton's and others' catalogues are evidence of the importance attached by seedsmen and the like to illustration in colour.

In seedsmen's catalogues the half-tone process is having and has had a good time, but the colour epoch is affecting gardeners' advertising matter—perhaps naturally enough—as much as any illustratable industry.

But here has been the trouble: Your successful gardener—specialist in one beautiful direction or another—has his nurseries in some remote part of a northern county, or Hampshire, or Cornwall, or worse still of the Channel Islands. He cannot entrust his most beautiful and precious blooms to the perils and disappointments of a railway journey; but here should come to the rescue our local photographer—the enterprising one, to wit, possibly yourself, excellent reader!

I see no reason at all but that of a morbid conservatism—or perhaps a reprehensible lazyboneishness—why the ordinarily skilled or the only-rather-cleverer among photographers should not also make himself a little intimate with actual practice in this marvellously easy process and become the Professor Autochrome of his little district.

Instead, therefore, of giving up the problem of the satisfactory reproduction of his beautiful plants, the gardener need merely call in Professor Autochrome, or send the plant to his local studio, and there you are!

As for the reproducing in three-colour block form, for the printing machine, certainly some engravers get on unhappily, but most of them are improving, and those essaying to specialise in Autochrome reproduction could do worse than see what Howard Farmer has to say in his lecture to the Chemical Congress of 1909.

My urging this year is more particularly to professional photographers to make a serious side-line of Autochrome work as a business investment. It may not yield a large turnover, but its introductions will count.

As to the difficulties of autochromy—they are almost non-existent. Let me bear that out by telling you of a photo-technical friend who is never so happy as when tackling some problem in emulsions or photo-mechanical work. After using a few dozen Autochromes he gave up the process altogether because it was, as he phrased it, "too confoundedly easy!"

I have confined my observations to autochromy plus typographic three-colour blocks applied to horticulture and the like; but no great imagination is needed to see that the commercial field in which autochromy may be profitably and attractively applied is well-nigh limitless.

AN OLD VAGABOND.

W. F. SEDGWICK, LTD.

Photograph by
W. T. GREEN.

Hints on Collotype for Post-card Printing.

By S. G. YERBURY.

CHILDHOOD'S JOYS.

Design and Block by E. HAMEL & Co. Photograph by FRECKLETON & Co.

A SHEET of negatives for post-cards in collotype is usually made up of films, but the following method in which glass negatives are used, yields quite as good results, and has several advantages in practical working. In the first place, in the matter of cost, glass negatives are very much cheaper than films, and further, each being detached, they are freely interchangeable between one sheet and another.

The negatives should be taken reversed in the camera, by means of a prism or mirror, either in front or behind the lens. They should, of course, be carefully graded to the same printing density, and, when dry, they are ready for cutting. For this a special glass cutting shape must be made about an eighth of an inch larger all round than post-card size. Place this over the negative and mark round with pencil, but the line along the base cut through with a knife.

Then make two boards with stops arranged so that on the first one, using a flat stick or foot rule, you can cut along the base line with the diamond, and also a true right angle for one side.

Then on the other board, against suitable stops, cut the corresponding sides.

In an ordinary way, of course, it is impossible to print a number of glass negatives together on a collotype plate, as owing to the varying thicknesses of the glass the majority would not be sharp. In order to surmount this difficulty it is necessary to make a mask or shape to receive the negatives. This takes time and requires great care, but when well made it will last the year through.

Take a stout piece of card rather larger than the sheet being printed.

Mark off the size of the printed sheet and the number of post-cards being printed.

Thus, on a royal sheet, which may vary from $24\times18\frac{1}{2}$ to $25\times19\frac{1}{2}$, twenty post-cards can be got on the sheet. Cut out the post-card openings rather larger than post-card size ; this will leave a cardboard margin of at least $\frac{1}{4}$-inch all round. Next get some long strips of cork cut, an eighth of an inch thick and three-sixteenths wide, and stick these all along the divisions on one side of the sheet, and on the other stick narrow strips of card of just sufficient width to allow the negatives to fit in.

We thus get a number of glass surfaces rendered elastic by the cork foundation, and with ordinary pressure collotype plates can be exposed on them, with every assurance that all will come sharp.

The retoucher should make good all defects, and stump in clouds, etc., but if the plate maker should notice any shadows which may print too black, a quick and easy way of stopping back is to rub a little blue-black ink in a little tallow, and apply at the back of the negative with the finger, softening off with the ball of the thumb.

A few general hints when machine minding may be useful to conclude with.

Do not give a long etch at first. A few minutes' etch should be sufficient to show the state of the plate.

Do not be afraid to put enough ink on the rollers at first, so as to get the shadows thoroughly inked.

After the first rough pull etch back the dark ones gradually, until the whole plate prints evenly.

Then paint all margins with ox-gall, blot off, paint with etch, mop up, and run on with the printing. Should any of the views begin to print light, take out all ink and cover with a weak solution of chrome alum, a few drops of strong solution in a tumbler of water will be enough. Leave this on for a minute, take off and put on ordinary etch for a couple of minutes, then run on with waste while the image is coming back ; it may take a little time but it will come back permanently darker. It may have a grey, flat appearance at first, but this can soon be brightened up with a little thicker etch, so that it will run good and even with the others, but not so good, of course, as if it had been exposed properly in the first place.

The exposure is, in fact, the critical point of the whole process. Every plate maker endeavours to get negatives of perfectly even density, but there may be circumstances in which he has no choice but to do the best possible with uneven ones.

The best plan is to draw a miniature diagram of the sheet of views, and mark off on it with plus and minus signs, the ones which require more or less exposure than the average, and cover these over in the printing frame accordingly, remembering particularly that the diagram will be the *reverse* of the sheet of negatives as viewed from the exposure side of the printing frame.

"On Scarboro' Beach."

E. Hulton & Co., Ltd

Photograph by
E. Hulton & Co., Ltd.

Gilchrist Bros. *Photograph by West & Sons.*

In the Solent.

"Swantype." Swan Electric Engraving Co., Ltd.

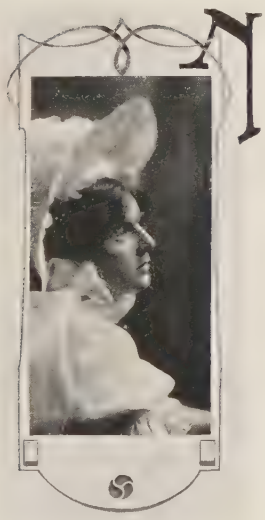
Alfred, Lord Tennyson.

From an original Chalk drawing, the property of the Swan Electric Engraving Co., Ltd.

Colour Sensitizers and Filter Dyes.

By Dr. E. KOENIG,

Photographic Chemist of the firm of Meister Lucius & Bruening, Hoechst a/M., Author of "Natural Colour Photography."



MISS PAMELA HOPE.

LONDON & PROVINCIAL REPRODUCTION CO., LTD. Photograph by H. GOULTON MAY.

NO new inventions are latterly to be recorded in this field—and it can hardly be expected that still better sensitizers will be found than those dyes of the Isocyanine series, now generally in use. In any case, it is doubtful if a demand exists for better sensitizers than :—

Pinachrome,
Pinacyanol,
Pinachrome blue, and
Dicyanine.

For photographic purposes the two first-named are the most valuable, whereas the two latter find more application in scientific photography. A desideratum would be a good green sensitizer which excels in effectiveness Pinaverdol and Orthochrome, as well as the phthaleine dyes, eosine, dijodfluoresceine and tetrajodfluoresceine (erythrosine).

I am continually in the habit of testing for sensitizing power all new dyes made for the dyeing industry, which, according to the spectrum absorption may be useful, but have found nothing up till now to eclipse those already mentioned.

Special attention in this connection should be given to a few new preparations for the manufacture of colour sensitive plates with subdued blue sensitiveness. It is well known that in all colour sensitive plates, the natural sensitiveness of bromide of silver for the blue rays is still too pronounced so that, in order to give a truer orthochromatic rendering of objects in colour, it is necessary to use a compensating yellow screen, which subdues more or less the blue rays. The use of such filters or screens has a great many disadvantages :—Large yellow filters in front of the plate are very dear, and to fix smaller ones in front of the lens very often injures the sharpness of the picture. On small cameras these filters very often cannot be fixed at all.

Commercial orthochromatic plates were, therefore, introduced some time ago to the trade, which, in addition to a sensitizer (*i.e.*, erythrosine), contain a yellow dye, which acts as light filter.

Such plates are now very popular—as they give a far better orthochromatic rendering than the ordinary so-called orthochromatic plates of commerce, whose results without filter are very little different to those of ordinary dry plates.

The preparation Erythrosine-Filter Yellow is used to obtain yellow green sensitive plates (which excel in orthochromatic effect the best plates that can be bought) by bathing ordinary dry plates as follows :—

Working Instructions.

1 gramme Erythrosine filter yellow is dissolved in 120 ccm. distilled water and 60 ccm. alcohol or methylated spirit is added. Denatured alcohol can also be used.

This solution keeps indefinitely in the dark.

The plates to be sensitized are carefully dusted, and bathed in the dark (for about three minutes) in the dye solution, then drained thoroughly of the superfluous solution and placed in a perpendicular position to dry. The drying must take place in a totally dark room without ventilator. In the above-mentioned bath twenty-four (9 by 12 cm.) $\frac{1}{4}$-plates can be bathed. The bathed plates generally keep better than the corresponding plates which have not been bathed. The general sensitiveness is reduced to about one half.

When making an exposure without filter, yellow and pale green are rendered lighter than blue. Orange is produced as dark as blue, red not at all.

Not all commercial plates are equally good for sensitizing with Erythrosine. It seems that those plates made by the ammonia method give good results. Those made by the boiling method are not suitable.

Whereas a yellow-green sensitive plate with subdued blue sensitiveness is nothing new in principle, panchromatic plates, with subdued blue sensitiveness, have not been known up till now.

To manufacture such plates use :—

Pinorthol I. and Pinorthol II.

which, in addition to a suitable filter dye, contain also an Isocyanine sensitizer.

Pinorthol I. contains Pinachrome and Pinorthol II. contains Pinacyanol. In consequence, Pinorthol I. sensitizes for green, yellow, orange and light red.

Pinorthol II. exceeds the first-named product by its greater sensitizing power for red, its sensitiveness to green being at the same time very poor. The method of using both dyes is the same—and all dry plates of commerce give good results.

Working Instructions.

3·5 grammes Pinorthol I. or II. are dissolved in 15 ccm. distilled water and diluted to 50 ccm. with alcohol.

These concentrated stock solutions may be kept in the dark, and will not change for many months. The diluted bath, however, will not keep more than a few days. The plates to be sensitized are bathed in the dark for three minutes in the following solution :—

Dye Bath :—6 ccm. of the above concentrated stock solution, 80 ccm. distilled water, 40 ccm. alcohol. This bath is sufficient for twelve (9 by 12 cm.) $\frac{1}{4}$-plates.

The keeping qualities of the plates are dependent on the excellence of the dry-plate emulsion. These plates do not generally keep quite as well as the Erythrosine-Filter Yellow plates.

The plates sensitized with Pinorthol render—on exposure without filter—light red equally as light as light blue.

When developing with Pinorthol I. plates, it must be observed that these do not stand the red light of more than 670$\mu\mu$ wave lengths.

Pinorthol II. plates are also sensitive to such dark red and should be developed entirely in the dark or with a dark-green light.

With three-colour exposures, Pinorthol I. plates are handled in the same way as Pinachrome plates. Pinorthol II. plates are to be handled the same as Pinacyanol plates.

The two dyes of Pinorthol I. and II. can be mixed as desired. The general sensitiveness of plates sensitized with Pinorthol is about one-third of the original general sensitiveness.

Filter Blue.

The filter dyes made by Messrs. Meister, Lucius & Bruening for three-colour photography are now well introduced in practice. Filter blue deserves special attention, as it can be used in place of crystal violet for making blue filters, and as it is much more fast to light than crystal violet. The way to use it is as follows :—1 gramme filter blue is dissolved in 180 ccm. hot water—by adding a little ammonia, 100 ccm. 6% gelatine solution is mixed with 20 ccm. of the dye solution, and the filter is then flooded on as with other filters.

For the green filter, a new blue green dye has been introduced of an extraordinary optical property. This blue-green dye absorbs not only the extreme red, but possesses at the same time a much purer shade than naphthol-green, which latter shows similar absorption.

By aid of the new filter, blue-green, light transparent green filters are manufactured absorbing all red. Working instructions are as follows :—1 gramme filter blue-green and 1 gramme rapid filter yellow are dissolved together in 100 ccm. cold water. 100 ccm. 6% gelatine solution are mixed with 20 ccm. dye solution and filtered.

For every 100 square centimetres plate surface, 7 ccm. dye gelatine solution is used. The filter is made of two such dyed glasses.

For the Additive Process and for a more yellow filter, the instructions are as follows :—1, 2 grammes filter blue-green and 2, 5 grammes rapid filter yellow are dissolved together in 100 ccm. water. 100 ccm. 6% gelatine solution are mixed with 20 ccm. of the dye solution.

For the rest, the above instructions apply.

Rapid filter yellow is very popular on account of its pure shade—its fastness to light and its good and clear solubility. It is about time that the antiquated instructions in connection with aurantia yellow filter should disappear from photographic literature. For the manufacture of collodion filters, auramine and dark yellow (soluble in spirit) are recommended.

In connection with the filter dyes, dyes for the illumination of dark-rooms should be considered. Red for dark-room light only transmits rays of 620/700$\mu\mu$. This light is only suitable for developing ordinary or yellow-green sensitive dry plates.

Dye Gelatine for Coating Dark-room Windows.

500 ccm. 6% gelatine.

4·5 grammes dark-room red are dissolved in 100 ccm. water.

For every 100 square centimetres glass surface use 7 ccm. dye gelatine solution. Always use two such coloured windows and lay the gelatine sides facing each other.

The dark-room green only transmits rays of 670/700$\mu\mu$ and blue-green rays of 515-550$\mu\mu$.

By the combination of these two spectral-regions, a flat light of indistinct greenish colour ensues, which is very agreeable to the eye. This light is, however, optically not lighter than a red light of equal chemical security. The light can be used for ordinary and yellow-green sensitive plates.

Dye gelatine for coating dark-room windows is made as follows :—500 ccm. of gelatine solution 6% and 4 grammes dark-room green, dissolved in 100 ccm. water.

The dark-room dark red transmits only the extreme red rays of 670-700$\mu\mu$ and a small district of blue-green (520-540$\mu\mu$). The dye-solution in daylight looks green.

Prepare dye gelatine for making dark-room windows as follows :—

500 ccm. 6% gelatine solution.

4·5 grammes dark-room dark red dissolved in 100 ccm. water.

The three above-named dyes may also be used for liquid filters in connection with electric dark-room lamps.

Pinatype Platinum Black for the Manufacture of Reversed Negatives.

This new method for making reversed negatives has found great favour in the reproduction processes. The original negative is copied on a Pinatype print plate which has previously been sensitized with chrome salt. The exposed plate is washed and then coloured with Pinatype platinum black. The image now appears of a brown colour. By treating with the so-called fixer (Fixator) the plate becomes black and equals fully a very finely-grained silver image. The dye on the plate is extremely fast to light. This method is without doubt the simplest, cheapest and surest of making duplicate negatives against all methods known hitherto.

Colouring Dyes for Gelatine Images.

After a great many experiments, I have found a number of dyes for colouring diapositives (lantern slides) and for gelatine-paper prints. The series of dyes in question comprises all shades, with the exception of the most brilliant eosines, rhodamines and peacock blues. Shades of this description fast to light do not hitherto exist. For use, the above dyes are simply dissolved in water. Any addition of egg albumen or similar preparations is absolutely superfluous.

Stereoscopic Projection Pictures made by means of Pinatype.

Two part images of stereo-negatives are copied on to Pinatype print plates. The one plate coloured with Complementary Green D. and the other with Complementary Red D. The diapositives are laid on the top of each other and are so projected by the lantern. The audience use spectacles with red and green glasses and consequently observe extremely plastic images of a black colour.

THE TURNING TIDE.

DIRECT PHOTO ENGRAVING CO., LTD.

Photograph by F. A. WILLIAMS.

J. T. Inkersell.

Design by J. L. Martin.

Govt. Printing Office, Wellington, N.Z.

Experience with the Acid Blast.

By HERMAN J. SCHMIDT.

THE DANSEUSE.

DIRECT PHOTO ENGRAVING CO., LTD. Photograph by E. E. HINDLEY.

SINCE returning home after my six years' tour in Europe, I have seen the introduction of Levy's Acid Blast Machines. The fact is, it is the only one in America; there is not even one foreign make here to my knowledge. Levy's machine is more substantially built than any I have seen abroad; it is made to last. We have two such machines where I am employed, the Peninsular Engraving Co., and both are entirely working up to, and even above, expectations. We have had them over a year now, and we are just as familiar with this method now as the other two life-long systems—still and rocked etching. It does not take long to operate the machine, it is only a question of a few trials to get familiar with the time of etching, the strength of the bath, and suitable pressure. We use our perchloride of iron at 35% or 40% Beaumé test, applying one pound pressure, and that works splendid. The average time of etching for 150 line screen is three minutes, and for coarse work (say 60 to 100 line screen), five to six minutes. In combination line and half-tones we etch the half-tone part first, then powder all up four ways with Dragon's blood, paint over half-tone part with any resist to make sure the half-tone does not get any more etch, and put into machine again for 10 minutes, same pressure (1 lb.); then powder four ways again and give another 10-12 minutes, that gives you ample depth for your line work on copper, which is afterwards routed in the open spaces. I myself am very much gratified at the way this new etching system works, and to be honest it has simplified the etching process very much. You will note that the etching bath should be never under 35% Beaumé, otherwise the iron etches too fast and opens your shadows too soon, almost as fast as it etches in the high lights. This iron is too thin if under 30%, and the work will look grey and need more staging or stopping out, whereas if iron bath is at 35% or 40% your bath is thick and syrupy, and it takes some little time longer to etch and open up shadow dots, which is quite an advantage, holding colour values better and giving soft gradations. But don't think that Acid Blast or any other Spray Etching systems will abolish staging. No, sir; if you want good work it must go through the same routine as before. Above all you get better printing depth and a sharper and cleaner dot in high lights and shadows, and for duplicating purposes it makes it easier for the electrotyper than heretofore. Most of you have no doubt seen microscopic illustrations showing tub and machine etchings, and if you haven't, get familiar at once. Study all you can, you cannot afford to be behind.

Sensitive Asphaltum.

By MAJOR-GENERAL J. WATERHOUSE, I.A.

Brussels Flower Market.

Wallage and Gilbett, Ltd. Photo by Godfrey Bingley.

ALTHOUGH asphaltum, or bitumen, was the substance used by Nicéphore Nièpce in the earliest recorded practical photographic process, and has since been largely used in photo-lithography and photo-engraving, its comparative want of sensitiveness has caused it to be superseded by the more rapid collochromate methods. It has, however, several special advantages as regards resistance to acids, thinness of film, clearness and sharpness of line and close contact with stone or plate, which though not so marked with regard to typographic etching, are still valuable for photo-lithography.

The great difficulty in working with asphaltum is the fact that scarcely any two samples possess the same sensitiveness to light and suitability for photographic work, so that it is impossible to lay down fixed rules for exposure and working, and the only way of ascertaining the photographic properties of any particular specimen is by actual trial. Asphaltum varies also very much in its behaviour with solvents, but by the method of extracting the most sensitive constituents with ether, recommended by Dr. R. Kayser, more rapidity and certainty in working can be attained.

Nicéphore Nièpce prepared his sensitive varnish by dissolving powdered asphaltum in oil of lavender, and applied it to the plate with a dabber. He also found it advantageous to dissolve the asphaltum in animal oil of dippel, allowing it to evaporate to the proper consistency. It was more unctuous, darker, held better, and apparently became insoluble more quickly when exposed.

His nephew, Nièpce de St. Victor, devoted himself to working out the process more thoroughly, and has given a great deal of practical information in his "Gravure Heliographique," 1856, and in various papers presented to the French Académie des Sciences in 1853-1854. He found that bitumen powdered and exposed to the air and sun for several days showed much more sensitiveness than the same bitumen not so treated. Increased sensitiveness was also gained by exposing the bitumen solution itself to the air and sun for two or three hours or longer, but avoiding a too prolonged exposure. He prepared his asphaltum solution with anhydrous benzine 90 parts, pure oil of lemon 10 parts, pure bitumen of Judea 2 parts. If too thin, more bitumen can be added to three or four parts.

In one of his earlier papers (October, 1853) he says he rendered his varnish

sensitive by pouring over the plate anhydrous sulphuric ether containing a few drops of rectified oil of lavender.

For work in the camera with very thin films, he investigated the action of several essential oils under two categories—those which cloud the ethers and those which cloud benzine—and from the former he selected the oil of lemon and benzine for his sensitizing varnish, and from the latter the oils of aspic and bergamot for consolidating the thin varnish after development of the image.

The idea of separating the more insensitive components of asphaltum with sulphuric ether seems to be due to Macpherson, of Rome (1855), who treated the powdered asphaltum with ether and used the insoluble residuum for the varnish with which he coated his lithographic stones.

In 1879, Dr. R. Kayser, of Nürnberg, made some exhaustive researches on asphaltum, and found that of the three different components of Syrian and Trinidad asphaltums, obtained by treating them with alcohol and ether, *viz.*: (*a*) soluble in alcohol; (*b*) soluble in ether; and (*c*) insoluble in ether—the substance (*c*) insoluble in ether, with the composition $C_{32}H_{42}S_2$, showed the highest sensitiveness with both; the substance (*b*) soluble in ether, showed less, and the oily substance (*a*) extracted by alcohol was quite insensitive. He also found that the sensitiveness of asphaltum was largely dependent on the quantity of sulphur present, and that as the Trinidad asphaltum contained only about 38 per cent. of the sensitive component (*c*), while Syrian asphalt contained 50 per cent. of it, the latter was preferable for photographic work, though it will be desirable to separate the most sensitive constituent and work with that alone.

His method of extraction by ether is as follows:—Syrian asphaltum is divided into pieces about the size of a pea and dried in the dark at a temperature of 40° or 50° C. (104°-122° F.). It is then powdered and shaken in a bottle with three times its weight of ether, allowed to settle and the ethereal solution decanted off. This treatment is repeated and then a quantity of chloroform about double the weight of the asphaltum first employed is added to the residue. The mixture is well shaken till the bitumen is dissolved and left to settle. The clear solution is decanted off and evaporated over a water bath. The residue is the true photographic asphaltum, and a solution of it in turpentine, benzole, or other solvent forms the sensitive varnish.

Another method is to make a strong solution of suitable asphaltum in chloroform and precipitate the insoluble constituent by adding about three times the volume of ether, decanting the solution and drying the precipitate.

The writer found it sufficient to digest the powdered asphaltum in a bottle with an excess of ether, shaking well from time to time, and renewing the ether at intervals until nearly all the soluble constituents were removed. The last ether was then poured off and the residue thoroughly dried.

Professor Husnik prepared a solution of sensitive asphaltum which the writer found to answer exceedingly well, and more sensitive than solutions of ordinary asphaltum. The purified asphaltum is now, however, readily obtainable.

In 1891, Professor E. Valenta found that, in conformity with Dr. Kayser's researches, the sensitiveness to light of asphaltum and some resinous substances could be increased by incorporating them with sulphur at a high temperature. Although ordinary resin could be sulphurized directly by melting with 15 per cent. sulphur, he found that asphaltum became carbonized before it made an even fusible mixture with the sulphur. He also tried heating a solution of asphaltum in turpentine, then adding sulphur and heating further. The resulting black resinous mass was readily soluble in benzole and was somewhat more sensitive than before, but not sufficiently so, and was rather sticky. He then tried

a mixture of asphaltum and sulphur dissolved in bisulphide of carbon, but the resulting dry product showed no increase of sensitiveness. It was then heated on a water bath and acquired some sensitiveness, which was further increased by prolonged heating in an air bath till sulphuretted hydrogen began to be given off at upwards of 180°C. (356°F.) and allowed to remain some time, giving off gas but not becoming burnt. This product was readily soluble in turpentine, benzol, chloroform and bisulphide of carbon, and in solution at 4 per cent. in benzol gave films on zinc which were very sensitive and gave clear sharp pictures when developed in turpentine. He found that it was one-and-a-half times more sensitive than asphaltum purified with ether and chloroform, or Husnik's preparation.

A later method of preparation was to boil 100 grammes of raw Syrian asphaltum with a like quantity of pseudo-cumene, boiling point 170°C. (338°F.), in which 12 grammes of flowers of sulphur had been previously dissolved, in an invert condenser; the dark brown solution gave off sulphuretted hydrogen plentifully, and after this had subsided in three or four hours, the pseudo-cumene was distilled off and the pitchy black residue dissolved in benzol at 4 per cent. The sulphurized asphaltum thus obtained was almost insoluble in ether, fairly easily in benzol, toluol, xylol, cumol and turpentine, and was very sensitive.

The writer has tried the effect of adding the volatile sulphur compounds, essential oil of mustard and thiophene to solutions of asphaltum, but, though they both seem to have advantages in some cases, the increase in sensitiveness is not sufficiently marked to make them valuable adjuncts.

In 1883, the writer found that iodine and chlorine had a marked influence on asphaltum, rendering it insoluble and more sensitive to light. Copper or silvered copper plates coated with a solution of asphaltum in turpentine to which a little iodine has been added show a visible image on the plate, which is usually distinctly more difficult to clear than a plate coated with the simple solution without iodine. Plates coated with solutions of asphaltum in turpentine and then fumed with iodine, have shown a distinct darkening of the coating and the same increase of resistance to solvents after exposure to light. The addition of iodine to solutions of asphaltum has a tendency to precipitate the resin and it is probable that a properly regulated fumigation will be the most efficient way of using it. Excess of iodine produces complete insolubility.

A good deal of information on photo-lithographic processes with asphaltum will be found in the articles by the writer in Vols. 27 and 28 of the "*Photographic News*," 1883-84. Also in Dr. Eder's "*Ausführliches Handbuch der Photographie*," second edition, Vol. IV., Part 4, 1899, and in Dr. H. Köhler's treatise "*Die Chemie und Technologie der Natürlichen und Künstlichen Asphalte*, 1904."

"Velsk," a Borzois.

The Expert Engraving Co.

Photograph by T. Fall.

Zigzag Path to Hanfar.

Yew Tree 1200 years old in Churchyard, Selborne.

Gilbert White's Grave, Selborne Churchyard.

Gilbert White's House, Selborne.

Fountain in Memory of Gilbert White.

Grove Street, Selborne.

The Premier Engraving Co.

Photographs by W. T. Green.

Gilbert White's Country.

The Expert Engraving Co.

Photographs by W. T. Green.

Thatching.

Glasgow Engraving Co.

Photograph by Thos. Nisbet.

Three Scots.

V. Siviter Smith. *Photograph by S. G. Kimber, F.R.P.S.*

York Minster. An Impression.

"Western Morning News," Process Dept.

Harford Bridge on the River Erme, South Devon.

The Direct Photo Engraving Co., Ltd. *Photograph by Foulsham & Banfield.*

Miss Alice du Barry.

Paynetype : The Direct Photo-Engraving Process.

By ARTHUR PAYNE.

BEFORE proceeding to give the working details of the Paynetype process I wish to direct the attention of those readers who are interested in this direct process of photo-engraving to the article by Mr. Gamble that appeared in the last volume of PENROSE'S YEAR BOOK, in which he dealt at length with the advantages of this process. The present article supplements what has already appeared and, in addition, gives the full particulars of the process that could not be published in the previous volume on account of securing the patent rights in some foreign countries. The process is protected in England by letters patent No. 28415, 1907, and No. 18775, 1908. Patents have also been applied for in the U.S. America and several foreign countries.

The Prepared Plate.

The prepared metallic plates for use in Paynetype are purchased ready for use in a similar manner to ordinary dry plates. They keep well and may be cut to any size by means of a guillotine machine used in the dark-room, which should be illuminated by a yellow light. Though the process is applicable for both zinc and copper plates as well as other metals, it appears to be more particularly adapted for use in zincography, and this article will deal only with zinc Paynetype plates, it being understood that other metals may be substituted for the zinc if desired. The prepared plate consists of a grained zinc plate coated with a spirit soluble resist, or varnish, upon which is coated an extremely thin layer of a gelatino-bromide emulsion. The resist prevents chemical action between the zinc and the emulsion, and also acts as an acid resist. The emulsion used is of about the same speed as wet collodion, but this speed can probably be increased if there should arise a demand for a faster plate.

The Process Explained.

The process is suitable for use in line work of an average quality, and coarse half-tone, but the manipulations are the same in both kinds of work, with the exception, of course, that for half-tone work a screen is used in front of the plate. The screen adjustments will be dealt with in a further paragraph.

Presuming that the copy has been focussed, the plate is exposed in the usual manner and developed, in a dark-room illuminated with a yellow light, for $2\frac{1}{2}$ minutes with a glycin developer ; rinsed under the tap for half a minute, and immersed in a 5 per cent. solution of potassium bichromate for three minutes, which has the well-known effect of hardening the gelatine film in the presence

of the silver image. The plate is then developed with hot water, like a carbon print, until the soluble gelatine has been washed away and the plate is free from "scum," the presence of the unexposed silver bromide that is allowed to remain in the film forming a good indicator as to when this operation is complete. After whirling the plate to remove the surplus water, it is warmed over a hot plate and fanned dry. The plate is then cooled on a stone slab and rocked in a dish with methylated spirit to dissolve the resist that is not protected by the gelatine film, and then thoroughly flushed with a full stream of tap water that must immediately remove the whole of the alcohol from the film. The loosened resist is then carefully removed by a wet tuft of cotton wool and the plate dried as before. If it is thought desirable, the plate may again be immersed in the methylated spirit and rinsed under the tap, after which operation the gelatine film is removed by friction with a pad of cotton wool and hot water, and the plate is ready for etching, or, if necessary, owing to a positive copy being made from a positive, for reversal.

LINE BLOCK PRODUCED DIRECT FROM ORIGINAL DRAWING THROUGH HALF-TONE SCREEN. REVERSED BY ELECTROLYTIC DEPOSITION OF COPPER

Probably the most popular method for reversal, at any rate, amongst process workers, will be by rolling up the plate with litho ink mixed with a small proportion of litho varnish applied with a composition roller. The plate is then immersed in methylated spirit for two or three minutes and developed as an albumen print with a tuft of cotton wool. This process has the advantage over the albumen process that there is nothing between the ink and the metal. The plate may then be retouched, dusted with dragon's blood and etched in the usual manner.

Another method for reversal is to electrolytically deposit a very thin coating of copper upon those portions of the zinc plate that are not protected by the resist, by means of a warm bath of copper cyanide and a weak electric current. By this means a sufficient coating of copper may be deposited in ten minutes to form an efficient resist for dilute nitric acid.

Schedule of Operations.

First development	$2\frac{1}{2}$ minutes.
Rinse in water	$\frac{1}{2}$,,
Hardening bath	3 ,,
Hot water development	2 ,,
Removing resist	2 ,,
Reversal with ink process	5 ,,
	15 minutes.

In Practical Work.

The process has been well tried in a photo-engraving establishment, and it is found that the proportion of spoils is about the same as when collodion and albumen are used. On the prices at which it is assumed the prepared zinc plates may be sold, the process is calculated to be 8 per cent. cheaper than wet collodion and albumen, and increases the output about 135 per cent. Owing to the facility with which the various operations may be dovetailed into each other, it is possible to further reduce the time consumed on each plate as given in the schedule. For instance, one operator, working single-handed, made eight half-plate line blocks in one hour forty minutes, or an average of $12\frac{1}{2}$ minutes per plate, this time including the putting of the copies on the easel, focussing, exposing, etc., up to the point when the plates were ready for etching. Another operator made twelve half-plate line blocks ready for etching in two hours fifteen minutes, or an average time of $11\frac{1}{3}$ minutes per block. Even this time may be further reduced by a sub-division of labour.

Photographed direct from Print upon Metal.
Reversed by Ink Method.

The process is suitable for about 75 per cent. of the line work met with in practice, for coarse half-tone work, for newspaper work, and for making large half-tone posters from small fine screen negatives, as suggested by Mr. A. J. Newton

Half-Tones from Prints.

Coarse half-tone blocks may be made direct from the original subject or from a print. In working from a print it is found necessary to illuminate the copy board with a powerful light such as is afforded by two enclosed electric arcs. This is because these plates are neither reduced nor intensified, and it is, therefore, necessary to avoid the use of a " flash " exposure which makes the shadow dots too large. The most successful results are obtained with the use of only one stop, either square or round. The largest stop that may be used is selected in order to reduce the exposure. The exposure, of course, varies with the character of the " copy," but taking as a standard a true black and white copy containing both black and white, lighted by two 12 amp. enclosed arcs and using a 65-line screen, the exposure was 20 seconds at $f/40$, with the screen set at $\frac{3}{16}$-inch from the plate. This exposure gave a full range of tone from a good high-light dot running into solid blacks. If the copy should contain no white, then increase the screen distance and give the normal exposure. If the copy contains no black, use the normal screen distance and decrease the exposure. If the copy is flat and contains

neither white not black, increase the screen distance and decrease the exposure. The broad principle depends upon the exposure being so adjusted that either a pin point dot, or else solid blacks, are obtained in the shadows, whilst the screen distance is set so that with the correct exposure for the shadows a suitable dot is obtained in the high-lights.

Half-Tones from Negatives.

A most useful feature of this process of especial interest to newspaper photo-

PHOTOGRAPHED DIRECT UPON ZINC PLATE FROM BROMIDE PRINT. REVERSED BY INK METHOD.

graphers, is that it is possible, and in fact easy, to make coarse half-tones by copying a continuous tone negative direct without the intervention of a print. Blocks may be made more rapidly from the negatives than from prints because, as a positive is obtained from a negative, the process of reversal is eliminated.

What this means in practice is that the time occupied in making a print is saved and in addition, the block is made from the negative and machine etched in fifteen minutes.

The conditions under which half-tones are made from negatives are quite

different from those found to be the best for prints. In the first place it is necessary to light the negative by transmitted light, an operation which may be performed in various ways, but probably the most satisfactory manner would be to place it in front of a condenser illuminated with an arc lamp. The other important feature that whereas a "flash" exposure must not be used when making half-tones from prints, it is absolutely essential when working from a negative, and it must be such a "flash" exposure as to give a good fat dot in the high-lights to stand reduction in etching, because the shadows of the negative are the high-lights of the prints. As a general rule the usual three stops ought to be used, *i.e.*, the "flash," a medium stop about *f*/40, and a high-light stop to close up the shadows on the print. The medium stop entirely influences the rendering of the middle tones and the exposure should be adjusted accordingly, remembering that a short exposure gives little contrast between the light and middle tones, but much between the middle and dark tones, and *vice versa* for a long exposure.

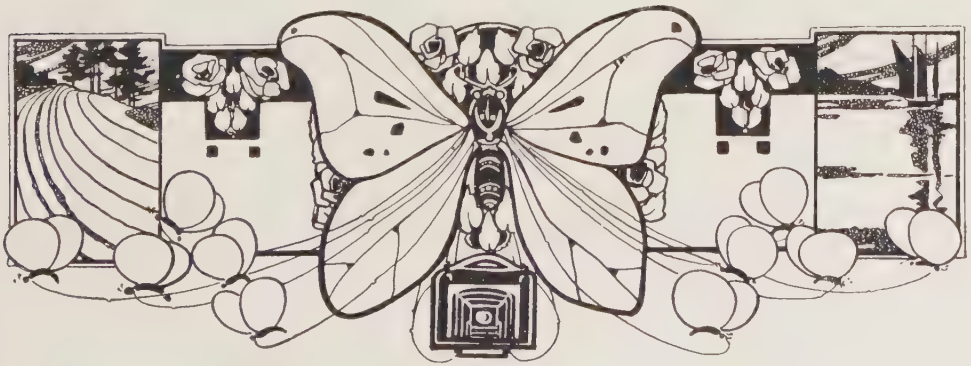
The Illustrations.

The initial letter, tailpiece and sidepiece are Paynetype blocks and designs made by Messrs. Hood & Co., Ltd., Middlesbrough, to whom I am indebted for permission to use them in this article.

The fashion plate of the little boy in his night suit is made direct from a line drawing through a half-tone screen, and is reversed by the electrolytic deposition of copper upon the zinc.

The small half-tone of my father was photographed direct upon the zinc plate from a print and was reversed by the ink method.

The half-tone block of the group was photographed direct upon the prepared zinc plate from a bromide print, using a 65-line screen and one round stop; the image was reversed by the ink method.



Commercial Photo-Ceramics.

By W. T. WILKINSON.

LOOE, CORNWALL.

THE DEAN ENGRAVING CO. Photograph by W. P. THOMSON.

BY the Collotype process it is possible to obtain photographs, in line or in continuous tone, on glass, plain or opal, which can be fired with results equal in delicacy and brilliance to the most difficult and expensive process of photo ceramics.

The negative is made in the ordinary way (*i.e.*, not reversed) and the Sinop modification of Collotype will be the most convenient method to use, because it can be worked under ordinary conditions, quite different from Collotype, which must have special rooms fitted up for it.

The Sinop plate is sensitized, dried and printed under the negative, as per book of instruction, and after drying down is "etched" with glycerine and water until in condition for working up.

The ink used is a good lake or tint ink with as little pigment or colour in as possible, thinned when necessary with any fatty thinning medium, especially for colours, whilst for black Penrose Rolling-up Ink for zinc etching will be the best

The ink is applied to the Sinop plate with a good composition roller, and the impression taken upon an indiarubber blanket, as used in tin-plate printing, this impression is at once transferred to the glass plate and forthwith dusted over with fine vitrifiable colour, with which a flux has been mixed, after which the plate is fired in the usual way.

The process is the application of photography to the "set-off" methods used by lithographers, and also for tin-plate printing, etc.

THE HARVEST WAIN.

AI ENGRAVING CO. Photograph by MARTIN J. RIDLEY.

Get it in the Negative.

By S. H. HORGAN.

A Little Jap.

Entwistle, Thorpe & Co. Photograph by Gunn & Co.

JUST a little space for what the writer considers one of the dangerous tendencies of half-tone engraving. It is the growing custom to leave the etching of the high-lights in the half-tone to the fine etcher, or finisher, as he is known in the United States.

In the early days this was not the practice. The half-tone photographer closed up the high-light dots in the negative as far as he found by experience that could be done and still permit the etcher a dot sufficient in width so that when it was etched down to a needle point the plate would be of the depth required. If there were absolute blacks in the copy it was represented in the negative by total transparency. "Flashing," that expedient of the lazy photographer, was not invented then.

But it might be said that thirteen or fifteen years ago no such half-tones were made as are now quite common. Let us not be too sure of that. Examine the best illustrated publications of that period and compare the results with those of the present time, remembering that much of the paper, ink and press-work of that day was inadequate to the printing of half-tones.

Herein lies one of the most valuable features of *Penrose's Annual*. By comparison of the exhibits of different years one can learn in which direction there is progress and wherein is there loss. Turn, for instance, to *Penrose's Year Book* for 1906. Opposite page 80 you will find "The Bishop's Walk, Lambeth," from a half-tone block by the Swan Electric Engraving Co., Ltd. Here we have, without re-etching, all the gradations from solid blacks up to adequate high-lights. Now compare this result with "The Mill Pond," by the same engraving company in the Annual for 1908-09, page 72. Notwithstanding all the re-etcher's work on the latter, see if it is any improvement over the one of a dozen years before. Also look at the duotype half-tone of Ellen Beach Yaw in the *Year Book* for 1896 and tell where you will find better work to-day.

What too often happens at present is this, the re-etcher, or finisher, having the last word on the block, wants the plate to come to him in half-tone so that

he can stop out the darkest portions and etch the middle tones lighter, if he wishes, besides putting in the high-lights. The result is that the photographer is forbidden to make negatives with high-lights, when most of the copy would be handled best by allowing the photographer to get the gradation in the negative.

Then the work of the re-etcher, or finisher, adds so much to the cost of the plate, for he is generally the highest priced workman, that it takes away the profit in the engraving from the employer. And again, when he is through with the plate, it is not a reproduction, but a translation to a degree depending on the trained eye and artistic skill of the finisher. Further, should he carry a part of the plate too far he is not always willing to admit his error, for it means the expense of making a new plate. The proof does not show the defect, but it remains to vex the printer every time he uses the block.

Understand this is not condemning re-etching altogether, or under-estimating the finisher's value to half-tone block making, but where the copy is right and a reproduction of it is what the customer wants, then, most frequently, a straight etching should be all that is necessary if a skilled half-tone photographer is permitted to *get it in the negative.*

THE CHURCH OF ST. CLEMENTS, CORNWALL.

CHAPPELOW & CO. Design by F. Adams. Photograph by M. J. TOZER.

Miss Maud Allen

Dean Engraving Company
Photograph by E. O. Hoppé.

This Mount is Rhododendron Pyro Brown Paper, Telanian Finish, made by The Mittineague Paper Co., Agents G. F. Smith & Son (London), Ltd.

British Photo Engraving Co.

Photograph by Dover Street Studios

Miss Hilda Antony.

The "Tone" Photo-Engraving Co.

Photograph by Lewis.

Architectural Subject.

By permission of Messrs. Hope & Sons, Ltd.

Half-tone Negative by G. A. Read.
Etching by G. P. Morris.

Photograph by A. A. P. Mackenzie.

The Public Trust Office, Wellington, N.Z.

Carl Henischel, Ltd.

Photograph by Frank Adams.

Child Study.

A. E. Dent & Co., Ltd.

Inks by Parsons, Fletcher & Co., Ltd.

A Sunny Corner.

Carbon Black Making.

A Visit to West Virginia.

By H. B. HOLDING (Binney & Smith Co.).

"PADDLING."

E. HULTON & CO., LTD. Photograph by E. HULTON & CO., LTD.

HAVING recently had the pleasure of visiting the Natural Gas Territories of West Virginia, U.S.A., accompanied by our Mr. C. Harold Smith, of New York, and of examining the processes carried on in the various carbon black factories located there in which our firm are interested, I readily respond to the kind invitation of the Editor to give the readers of Penrose's Annual a few preliminary particulars regarding the industry, in the hope that they may interest users of carbon black, especially those engaged in the printing ink and allied trades.

In previous issues of the Process Year Book, I have fully described the way in which carbon black is produced and the essential differences between the various qualities manufactured, and have pointed out that, although made under precisely similar conditions, the blacks from different gas wells differ from each other for body-colour, covering-power and flowing-properties. They are all hydro-carbon gas blacks certainly, but variations in the quality are so marked (in small, but important, technical directions) that it is essential, in order to ensure uniformity of result, that manufacturers of colours and printing inks, should insist upon obtaining the product of exactly the same well and not be misled into believing that all carbon blacks are alike. Manufacturers who have been in the habit of treating gas blacks know how one grade will be hard to grind and another be soft; that one will incorporate easily with a varnish and another will not amalgamate readily; that the ink made from one will flow smoothly down the fount of the press and another remain "sticky"; that one will have a brilliancy which is not possessed by another; and that there are many other inexplicable variations—to avoid which the only remedy is to continue to use just that black which has given the desired results, and not to imagine that all carbon blacks on the market are identical.

In the course of my enquiries on the spot, I tried to discover the reason why such differences should exist in a commodity which was obtained (within an area

of 100 square miles) under precisely the same mechanical conditions, but failed to find the reason. Many scientists are endeavouring to solve the problem, and after further years of research perhaps a satisfactory solution will be found. I did, however, learn what it was that resulted in the superiority of peerless black over all others for producing the best inks for the finest litho. and half-tone work. The process is quite different from that obtaining in ordinary carbon black works ; greater care is taken in regulating the pressure of the gas and in eliminating the water and to prevent the freezing of the pipe lines, as well as in obtaining an exactly even temperature despite the climatic conditions and seasonal variations. The rollers upon which the black deposits are unique and the burners utilized are not at all like those used elsewhere, and above all the quantity of gas necessary to obtain the same weight of black is more than double that needful for ordinary grades. The effect of all these differences and improvements is that the carbon in Peerless Black is in such a much more finely divided state that greater " body " is given to the ink without impairing its flowing properties and a more intense blackness is obtained when printed, so that all the fine lines fill in clean and clear and the deeper effects of the block are effectively displayed.

To give some idea of the extent to which natural gas is used in America, I may quote the following particulars taken from the " United States Geological Survey of Mineral Resources " for the year 1907, regarding its production in the States named :—

Pennsylvania	produced	135,516,015	thousand	cubic	feet.
West Virginia	,,	122,678,236	,,	,,	,,
Kansas	,,	74,526,300	,,	,,	,,
Ohio	,,	52,040,996	,,	,,	,,

The value varied from 13 cents per 1,000 cubic feet in West Virginia to 16 cents in Ohio ; while in California (which produced 230,344 thousand cubic feet) the value was stated to be 73 cents per 1,000 cubic feet.

These prices thus officially mentioned apply of course to natural gas which is used for domestic consumption and for manufacturing purposes, and they may be quoted here as evidence of the intrinsic value of this product.

To obtain only one pound of carbon black it is necessary to consume between 1,500 and 2,000 cubic feet of gas. Your readers will therefore be able to form some idea of the difficulties our firm has had in getting possession of adequate gas territory on such terms as will enable us to supply carbon black for many years to come without, it is to be hoped, having to materially increase the present prices.

From a report appearing in " The Natural Gas Journal " of a recent Conference, I take the following excerpt out of a most interesting and instructive address delivered by Mr. J. A. Bownocker, State Geologist, Columbus, Ohio, regarding :—

THE ORIGIN OF NATURAL GAS.

" Natural gas is always present with oil and large bodies of gas are seldom remote from oil. In other words, these two fuels are intimately associated. Further, they belong to the same great chemical series and there is every reason to believe that they have had a similar origin.

" These fuels are never found except in stratified rocks that are highly fossiliferous or in rocks that overlie such. Thus the Trenton limestone shows unmistakably that it was deposited in a sea containing an abundant fauna. The Clinton sandstone overlies the great shales of the Hudson series, rocks that teem with organic remains. The oil and gas rocks of the Devonian overlie or are interbedded in shales that contain much organic

matter, and the situation is similar with the oil and gas rocks of the Carboniferous. This relation is very suggestive.

"Geologists are agreed that natural gas was derived from organic matter, that is from animals and plants. How the change was brought about, however, is an open question. Distillation has long been maintained by some, but this, using the term in the customary way, requires a high temperature, and this the geologists cannot grant, for in our deepest well, a well reaching a depth of more than a mile, the rocks gave no evidence of metamorphism such as would have probably resulted from a temperature of only 200° Fahr. Further, in the bottom of this well the temperature was little more than 127° Fahr. Such data seem to preclude the heat necessary for distillation. Others think that a low temperature acting slowly and for a long time may have brought about the change.

"A few years ago Dr. Morrey of this city, suggested that bacteria have been the agent of change. Push a stick into a layer of mud along a stream or swamp and occasionally gas will bubble forth. This is marsh gas, and according to Dr. Morrey has been produced by bacteria acting on organic matter. Marsh gas is the chief constituent of natural gas. He further states that bacteria are producing other, though related, gases, and that the products from animal and plant remains may show certain differences, such as we find in gas derived from sandstones and limestones. Possibly different types of plants may yield products somewhat unlike. This interesting theory will probably receive more consideration in years to come."

I hope, on another occasion, to have the opportunity of presenting to your numerous readers much other interesting information obtained as a result of the investigations I made, and from studying many Government Reports on the subject.

THE BROKEN VIOLIN

E. HAMEL & CO.

Photograph by
FRECKLETON & CO.

Half-Tone Blocks in Newspapers.

By A. J. NEWTON,

Principal, L.C.C. School of Photo-Engraving and Lithography.

Design and Block by
Students of L.C.C. School of Photo-Engraving.

EVERY engraver who has supplied blocks to newspapers must have experienced a shock of keen disappointment when he has seen the result as printed in the newspaper, especially when he knew that, so far as his work was concerned, it was all that could be wished in respect to depth of etching and cleanness of cut. Nevertheless the engraver was frequently blamed by the other craftsmen concerned in the production of the illustration, *viz.*, the stereotyper and the printer; each, in fact, blamed the other in turn, perhaps with a certain amount of justice at first, but latterly no blame ought to attach to the conscientious engraver. The printer has also made great efforts to meet the new conditions, and in place of the soft blanket formerly always used on the printing machines we find now rubber blanket and thin cloth, which forms a harder and far more suitable packing for rapid half-tone printing.

The greatest culprit, I am afraid, is the stereotyper, though perhaps he is not so much to blame as the materials he has been in the habit of using, which, while satisfactory enough for type, will not do for half-tones. Paper flong is unsuitable and remains unsuitable even though it be provided with a "facing paste." It should be replaced by some material that is equally convenient in use as regards flexibility and so on, but that would be certain to penetrate to the bottom of the etched hollows of a half-tone, and then would not shrink, or alter in size afterwards.

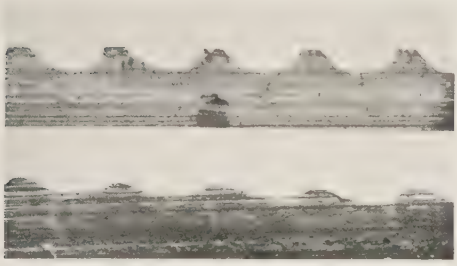
No. 1.
Upper Section. Original Etched Plate.
Lower Section. Stereotype from same.

The accompanying illustrations will show exactly the effect of stereotyping far more effectively than words can explain. They are photomicrographs of sections of a high-light in a half-tone block and the stereotype from the same spot, and all are from actual pieces of trade work. The magnification is about 20 times.

No. 1 shows how a good plate can be made to yield a stereotype that, of course, can only print as a black smudge, a travesty of the original.

No. 2 shows an improvement, but the stereo is still far from as good as the original plate. This was made in the Autoplate machine.

No. 3 is probably as perfect a duplicate as can be made with the present materials. This was made for me by Mr. Best, of Leeds, and it shows that in spite of every precaution there is still a little loss. The dots (No. 4) are magnifications of impressions from example No. 3 (*a*) from the original plate; (*b*)

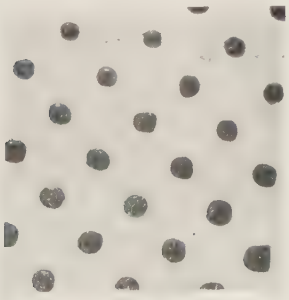


No. 2.
Upper Section. Original Etched Plate.
Lower Section. Stereotype from same

No. 3.
Upper Section. Original Etched Plate.
Lower Section. Stereotype from same.

from the stereotype. Making every allowance for the spread of the ink, these two illustrations also show the slight spread in the stereotype.

It would appear that the loss occurs in the papier maché matrix, which, I suppose, shrinks in drying. I am unable to show any photo-micrographs of



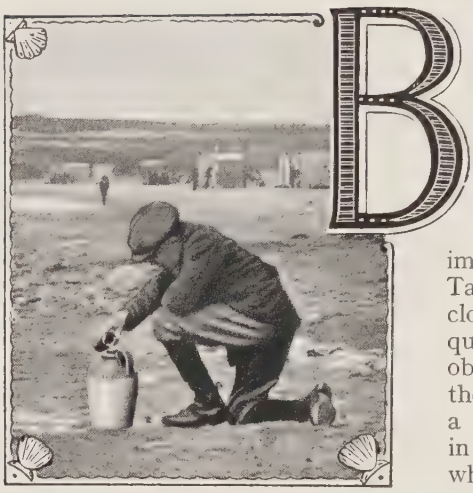
No. 4 (*a*).

No. 4 (*b*)

this, as I have not been able to cut satisfactory sections so far, but the illustrations shown are quite sufficient to prove that the block maker is not at fault, and also to show that in some cases the stereotype is so bad that the printer could not be expected to do anything with it. Nevertheless the third illustration shows that when proper materials are used and proper care taken, the duplicate can approximate to the original far closer than is often the case.

On Fancy Borders.

By F. FISSI.



"Robbing the Sea."

Design and Block by E. Hulton & Co., Ltd.

Photograph by F. G. Curzon.

BORDERS! "I don't want them. Why should I pay as much for borders as for the photographs themselves?" This remark has been repeated to me so many times that I hesitate to suggest borders any more. Happily there are many editors who recognise the value of the "extravagance" in the consequent improved appearance of their journals. Take a daily paper with pages of closely printed matter and scarcely a quarter of an inch of white space observable anywhere unless it be in the margin of the page. Imagine a block — say, a portrait — inserted in the centre of such a page— what does it look like? Mean and poverty-stricken. Whereas if the block were inserted with a slightly ornamental border the general appearance would be at once pleasing and effective.

The extra cost would be so trifling that it need hardly be considered— a very few shillings, and the same border block could be used time and again.

Fig. 1. Showing photograph inserted in a newspaper without a border.

Fig. 2. A similar photograph inserted with border. Note the difference of effect.

An editor gives an artist an order for half a dozen border designs costing five shillings each, and the blocks from same cost three shillings each—48 shillings in all—what extravagance! Say the paper is a weekly and its editor purchased six borders—a different one could be used each week for six weeks; then start again with number one, and I would be bold enough to say that not one person in two hundred would notice or remember the first border after six weeks; if he did, he would not think any the worse of it, as it would be fresh to him.

Some editors leave their printers to make up a border out of printers' ornaments, etc. What is the result? Why, simply this—unless the printer be a real genius or a man of artistic taste the border would consist of a number of lines all round the picture, with perhaps little stars between them, or a more up-to-date man would insert a lot of X's or O's.

It is easy to see what can be done in the way of borders by looking through this volume or any of the previous volumes of the Year Book. It will be

Fig. 3. An elastic border. Duplicate blocks are made of a suitable size and placed round the blocks, one set at top and one at bottom, and joined together with printers' rules, either lines or curves, etc. If the design is to fit the block close up, the latter must be cut or vignetted.

Fig. 4. Same particulars as applied to No. 3, but the two smaller ornaments are to be inserted in the middle or in any convenient place down the side of border line to make a break.

seen that the same border will not serve for all subjects, although some borders look well round a great number of subjects. A design with honesty plant or the lily as a basis does not look homely round a likeness of a murderer, or a prize-fighter. Nor does a design made up of dice, horseshoes or beer-bottles look well round a view of the local vicarage.

Some editors, I found, would not entertain the idea of borders, because they thought it would always be necessary to use the same size blocks, but this was, and is, not so. It *is* possible—I have made a great many designs in what I term my elastic borders; that is to say, I make up the corners of the designs and even little breaks down the sides if necessary to be joined together by printers' rules. These are very satisfactory for a cheap job, a cheap paper, a cheap mind, and for cheap people to look at.

Fancy borders are more in vogue than they have ever been. They have come to stay. Americans are a long way in front of us in this matter, and

there always seems to be an artistic finish to their papers which we have not. Only a few journals in this country have pluck enough to copy them, always with more or less success, and by so doing they transform their dead, stern and solid-looking pages into something inviting and tasty. I could mention one penny weekly whose pages are crammed with illustrations : this particular editor spends a good eighth of the cost on borders alone every week. Besides this he uses some over again and again. Borders are also used frequently for advertisements. Sometimes the strong and striking lines of the design attract the eye more than the lettering, etc., which they surround. Advertisements made up in this way are certainly more attractive than a square space filled with letterpress.

Fig. 5. This shows a border made up of corner pieces drawn in line and joined up with printers' rules. By this method a border can be made up to any size in proportion. The rules are shown between the arrows marked A.

The illustrations to this article will give a rough idea of what a paper looks like with borders to its illustrations, and without I think process men should suggest such improvements to the printers, and printers should suggest them to the editors. The result would be more attractive papers, which would naturally tend to increased circulation, more work for the process man, and more work for the artist.

A Submarine

T. B. Browne, Ltd.

Photograph by West & Sons.

V. Siviter Smith & Co.

A Portrait Study.

Electric City Engraving Co.

Nature's Staircase.

Emery & Son, Ltd.

Inks by A. B. Fleming & Co., Ltd.
Photograph by West & Sons.

The Old and The New.

H.M.S. "Dreadnought" passing the "Victory."

How Static Electricity Annoys the Electrotyper.

By GEORGE E. DUNTON.

PORT ERIN.

Photo by
HILL & CO. W. P. THOMSON.

THAT static electricity is more or less troublesome to the electrotyper is a fact which may be clearly established and fully understood by simple experimental demonstration.

The term "static electricity" simply expresses the fact, of the presence, or a manifestation of energy through the medium of electricity, enveloping covering or surrounding a body or resident upon its surface. In itself a so-called "body charge," in or at a state of equilibrium. This charge may be free to act by virtue of its potential energy, or it may be bound by the near presence of another charge of a higher or lower potential, induced by the development of this initial charge and the two are separated by some insulating medium.

Without making an attempt to elaborate upon electrical phenomena through static manifestations, we feel, however, that it is necessary to make some explanations and to offer some parallelisms in order to explain lucidly that which has been developed through experiment.

For a considerable period of time we have felt the conviction, that in the so-called black-leading of wax moulds by either the air machines, dependent upon a blast of compressed air to spread the coating of black lead over the surface of the wax mould, or the brush machine, wherein the black lead is patted or beaten into and over the surface of the wax, the resultant friction of the blast of air and the brush against the surface of the wax results in the surface becoming statically charged with electricity, and in consequence attracting and holding in bondage many of the minute particles of the black lead used in the polishing of the surface of the wax. Of course, we depend upon what black lead adheres to the wax to make its surface conductive, but more than this detracts from the sharpness of our electrotype plate, consequently it is superfluous, and unless it can be removed is detrimental.

Many electrotypers have undoubtedly noticed at times that electrotypes from fine screen half-tones, especially in the stipple of the high-lights, appeared thick and muddy, lacking that brilliant contrast of the original plate, from the half-tone and deeper shadows and in the finer type; that the dots and hair lines were filled or partially so in the reproductions. These conditions do not maintain continuously, but periodically, and no doubt the man at the pump has been blamed for being negligent at times in the performance of his duty. Examination

of such plates with the microscope will show, that there has been a partial filling of the finer dots and lines in the wax mould at some period of the process. By following the work carefully and making microscopic examinations regularly between each operation, the period at which this filling takes place may be definitely noted.

In order to pursue these investigations intelligently, a mould is made with due care, and the surplus moulding lead is brushed away. A small section, about an inch square, is carefully cut out and removed from the mould for examination. This piece, which should be a portion containing the finest stipple of a half-tone, or the finest type, is placed under the microscope and an exhaustive examination made. If the mould is all right the stipple or dots should terminate in sharp, well-defined, flat points, presenting even surfaces. Unless the original, if a half-tone, has been over-etched, resulting in the points of the dots having been carried below the surface, then the point of the dots will be rounding at the face. If this rounded condition is present in the mould, an examination should be at once made of the original to see if these conditions maintain. If so the engraver needs attention.

With a microscope giving from ten to twelve diameters, that is, magnifying from ten to twelve times, the face of the perfect dot should appear to be about one-twentieth part of an inch in diameter, this will be sufficient to detect any imperfection, even the presence of minute flakes of moulding lead in the point of the dots. It is much easier to examine the mould with the microscope than the plate, because the compound microscope reverses conditions, and the portions which are indented in the mould appear raised under the microscope. The mould appears turned wrong side out, with the dots standing up, consequently it is easy to scrutinize their surfaces.

If the conditions of the mould appear satisfactory from the section examined, replace the piece tacking it at the four corners, with a hot building iron and wax. Have the entire mould run through the leading machine, remove the piece and again examine the condition of the dots with the microscope. Note if there has been any change in the dot points. If they are sharp and well defined there can be no further trouble, but if they vary in height, presenting irregular rounding points, then there is trouble ahead. Have the piece blown out and thoroughly washed out under the pump, of course placing it again in the mould and catching it at the corners, then make another careful examination to see if the same conditions maintain. If the dots still show that they are filled or partially so, with black lead, then it is safe to presume that the surface of the wax has become " statically " charged with " electricity," and that the particles have become attracted to each other and are bound electrically to the surface of the wax by what is termed " static induction." This bond will maintain until the charge or charges can be dispelled or dissipated. If the mould goes into the bath in this condition, the deposit of metal will readily take place over this filling of black lead in the dots and points and we only realize a value in the plate corresponding to the degree to which they have been filled. The more or the greater depth of black lead in the dots or points, the thicker or more muddy appearing the print will be in the high-lights, and if type, the dots will not print at all, presenting what is known to the electrotyper as " rotten face."

There is no doubt that in the black leading of the mould either by the brush or the air machines, that there is the development of conditions producing an electrification of the surface of the wax mould, known to us as a body or surface charge and commonly called " static electricity."

The development of static charges, or the electrification of the surface of the

wax is due to energy expended in friction ; polishing the surface of the wax mould. A part of the energy reappearing again in this form of electrical storage. We then have an accumulation of energy in the form of an electrical charge, distributed over the surface of our wax mould. We also have a secondary charge which has been induced or drawn to the metallic case backing the mould by the presence of the initial charge over the surface of the wax, but of different potential. Each exerting an influence to hold or bind the other, owing to this difference of potential.

To obtain a better understanding of the conditions which produce this state of electrification on the surface of our wax moulds we cite two simple experiments, first to show that the electrification of the surface of non-conductive substances is possible through the agency of friction, and that such electrified surfaces become attractive to other substances ; second, to show that substances attracted to the electrified surface of other substances may be held or bound to their surface by the presence of other electrical conditions exhibiting a difference of potential from the first and separated from it electrically.

If you take a piece of sealing-wax or other resinous substance, hard rubber or glass, and rub it with a piece of woollen cloth or silk, it will attract to itself such slight bodies as chaff, or dust, or bits of paper. After a few moments the particles drop or fly away from the body. This is due to the fact that they attract or take from the first body minute charges of electricity of equal potential and thereby are repelled, a state of equilibrium having been established between the two bodies, there is no further attraction. If the body had a piece of metal embedded within itself which could be connected with the ground and which had no contact with the electrified surface of the body, the smaller particles which had been attracted to its surface would remain upon its surface for an indefinite time, or until such time as a state of equilibrium should be established between the surface of the body and the metal embedded within the body, by bringing the two into direct contact, when the particles would drop from the electrified surface as before.

To better understand the conditions which maintain to bind or hold the particles of black lead in the points and dots of our wax moulds, after they have been polished, we will describe parallel conditions which are clearly shown by the operation of the first static or frictional electric machine known as the " Electrophorus." The electrophorus consists of a disc of resinous substance covering a somewhat smaller metal plate having no connection with the surface of the disc, but which may be connected with the ground. A cover of metal, smaller than the disc also, and provided with a handle of an insulating material, though it does not directly concern what we desire to illustrate. But its use shows how it is possible to obtain by the principle of influence, an unlimited number of charges of electricity from one single charge and is the fact taken advantage of in the operation of all the so-called " Statical electric machines."

Removing the cover from the electrophorus, the surface of the resinous disc is rubbed with a piece of woollen cloth or piece of fur. Sprinkle bits of paper lint over the surface of the resinous disc and they will adhere so firmly that they cannot be blown away by the breath. Remove the electrified disc from the metal plate and in a few moments the bits of paper lint may be readily blown from the surface of the disc. They are no longer bound by the presence of an induced charge in the metal plate and as soon as there is an equality of potential established between the charges of the two bodies they become repellent to each other, and then are readily separated.

We are able to establish from these comparisons these facts. The electrotypers' wax mould with its metallic back is an ideal electrophorus. The hair

in the brushes of the leading machine proving an excellent exciter, more efficient than the blast of warm air from the air leading machine, both, however, will electrify the surface of the wax mould and the particles of black lead, being in themselves conductive, will adhere more firmly and attract other particles with more energy than the paper lint.

The fact that more black lead accumulates and that it is removed with greater difficulty from the deeper and finer dots and points is due to a well-known law in connection with static and frictional electricity, which is that the attraction exerted between two body charges of electricity varies inversely to the square of the distance to which they are separated. The smaller the separation the greater the attraction. If the face of the dots were only one-half the distance from the metal case, that is, back of the mould, compared with the spaces and quads, (which, of course, they are not in this exaggerated ratio) then the attraction between the portion of the surface charge at these points, and the back of the metal case, would be four times as great as at the surface or back of the wax on the spaces and quads. This gives a very satisfactory account for the black lead sticking so persistently into the points and dots, refusing to let go from the face. The lines of electrical force converge and centre into each and everyone of these minute dots holding a certain portion of black lead bound along each line of force centring in the edges of the dots and points.

To the electrotyper who may desire to experiment along the lines on which this article is written, he will need to provide himself with a gold-leaf electroscope and proof-plane. With the latter, particles of electrified black lead are removed from the mould and transferred to the knob or plate of the electroscope. If there is the least electrification of the particles of black lead it will cause a noticeable divergence to the leaves of the electroscope ; which we have found to be the case, with particles of black lead removed with the proof-plane from moulds black-leaded by both the air and the brush leading machines. Those particles of lead taken from moulds leaded by the brush machine showing a greater degree of electrification than those from the air machine. Having demonstrated the fact that these particles are electrically charged, that is, if they cause the leaves of the electroscope to diverge ; with a piece of wire touch the back of the metal moulding case and also the knob or plate of the electroscope at the same time, the leaves of the electroscope will immediately come together momentarily, showing that the electrification of the metallic case is of a different nature than that of the surface of the wax mould, properly of a different state of potential. To demonstrate this fact clearly it is better to first connect the surface of the wax with the knob of the electroscope, that is, touch them both at the same time with the wire. By this means the electroscope receives a greater volume charge than from the particles of black lead from the proof-plane. The leaves of the electroscope will be found to separate widely. Now if the knob is connected with the back of the mould, or with the case, the leaves will instantly fly together again, showing that there is existing between the surface of the wax and the metallic moulding pan or case a perceptible difference of potential. Just as long as this difference of potential maintains, or as long as these two charges are held in bondage, one by the other, being separated by an insulating medium the black lead will be firmly held into the extremity or end of the points of the finer type and the stipple of the half-tones.

Washing the mould with an ordinary stream of water from the hydrant tap, or from the force pump will not break up or dissipate this electrical state.

Several experimenters in America have been working to overcome this resultant condition without, we are confident, realizing or understanding what

the cause actually was. They have found that if they could do away with the black lead altogether or if compelled to use it, if they could mix the lead with water, some adding other chemicals to increase the conductivity of the coating, they could obtain a much sharper point and dot in the electrotype plate reproduction. One August Gerstner, of this city, New York, in December, 1906, obtained a patent in the United States for a "Solution used in the art of Electrotyping," which consisted of two ounces of "nitrate of silver," four ounces of "chloride of sodium," and four pounds of moulding lead to each two gallons of water. This dope is mixed up and squirted over the face of the wax mould with a force pump the same as we wash out with water, the inventor claiming in his application that this process would make "black-leading and coating with iron and sulphate of copper unnecessary." The *modus operandi* of the solution is "claimed" to be as follows: "This solution which is applied to the mould for forming on the mould a thin coating of chloride of silver, which will combine with the copper in the plating bath to form a metallic silver coating," on the mould. (?) Metallic copper, iron or zinc will precipitate metallic silver from a solution of its chloride, but cupric sulphate solution will not, which is the element that Mr. Gerstner must depend upon in the plating both for this action, as the metallic copper has not been deposited when his action is supposed to take place.

Gerstner has had several imitators, for we believe that all of these so-called "metallizing solutions" depend for their action on the energy of some by-product of silver nitrate. Nitrate of silver is an expensive chemical and adds very materially to the cost of production, which is an item that must be husbanded in these days of severe competition and low prices. Iron filings and sulphate of copper are not nearly as expensive, and results are on par with the very best that it is possible to obtain with silver salts.

The only compliment that can be paid to Gerstner or any of his imitators, comes from the fact that they moisten their black lead, thus preventing any possibility of electrifying the surface of their wax mould. They can safely dispense with the silver and sodium salts, using simply the black lead mixed with water and squirted over the surface of the mould with an ordinary force pump. This method is not new, however, as it was used in the early eighties by C. J. Peters and Sons, Boston, and afterwards abandoned by them. We do not remember who the inventor was. Several of the prominent electrotypers in this city have tried some one of these wet processes and I know that they are not generally successful, many having returned to the old methods.

There is one process of depositing metal on non-metallic bodies which deserves special mention as the inventor, Mr. Cassius Blacklidge, of Washington, D.C., actually precipitates a film of metallic silver on or over the surface of his wax mould before the mould goes into the bath, dispensing with black lead or copper coating altogether. He first flows the mould with collodion, using a redissolved precipitate of silver nitrate in ammonia and throws down the metallic silver with a forty per cent. solution of formaldehyde. Of course, this method is expensive, but it gives a coating of true metallic silver on the surface of the wax mould. There is another method now used by the mirror manufacturers for precipitating the silver backs upon their sheets of glass called the Liebig process. It depends upon the precipitation of a metallic silver on the surface of glass, we have used it successfully on wax. From an ammoniacal solution of silver nitrate with caustic potash metallic silver may be deposited upon wax by the use of milk sugar dissolved in alcohol. The precipitation is slow, as the precipitation depends upon the evaporation of the solution.

The presence of silver in the copper bath, in any form, is to be discouraged,

and especially in a metallic state at the cathode or on the mould. At the moment hydrogen is liberated at the cathode, and there is a metal present, the oxygen which has been set free by the liberation of hydrogen is liable to attack and unite with the metal forming an oxide. This oxide attracts the nascent hydrogen, uniting in the forming of a sulphate of silver which dissolves into the solution of copper sulphate, especially if we are using a heavy current or a strong current. After a time the solution becomes impregnated with silver, turning in colour to an opaque opal or robin's egg blue. It will be found impossible to deposit good copper shells in this solution after this change has taken place.

As the majority of us are using either the air blast or the brush black-leading machines, we are, of course, interested more in learning how to abate the nuisance which arises from the static electricity developed through these sources than in the more expensive silver coatings.

There are two methods of breaking up or dispelling this electrified condition or state of the surface of our mould. One the dry and the other the wet method. The first we will call dissipating and the second annihilating.

By the dissipation method the mould is placed directly upon a metallic plate connected with the ground and brushed over with a soft brush, which has the base or tie wires of its bristles all connected to a binding post on the handle, on the upper or top side of the brush. The brush is made in the ordinary hair brush type, of very soft goat or badger hair, in place of bristles. This brush is connected by a rubber-covered wire to a small Topler Holtz static electric machine and, with the machine in operation, the mould is carefully brushed over its surface with the electrified brush, connected to one pole or discharge knob of the machine and then the other. After a few minutes the charge on the wax mould will be dispelled and it may be washed out and coated with copper in the usual manner.

By the annihilation method, which is much simpler in its operation, a moulding wax must be prepared which contains no gums of a resinous nature, as the annihilating fluid will attack and dissolve all kinds of pitchy gums. The fluid used is made as follows :—Saturate one gallon of water with common rock salt, which is sodium chloride. When it will dissolve no more pour off the clear liquid and add to it four gallons of wood alcohol. This solution should be kept in a narrow, deep trough with a cover which will practically seal the trough, keeping it air-tight when not in use. The trough should be lined with sheet lead.

Each mould containing fine cut work, half-tone or fine type or stipple only, should necessarily be put through this solution, letting the mould remain from three to seven minutes according to the character of the cut or type. It is good practice to let the first mould remain about seven minutes suspended in the annihilator. The moulds are hung in this solution immediately after they come from the leading machine, before they are pumped or washed out. The mould is taken from the trough and placed in the washing-out sink. Before this mould is pumped out a second mould is placed, hung or suspended in the annihilator and allowed to remain there while this first mould is being washed or pumped out and coated. While this second mould is being washed out and coated a third has been hung in the annihilator and so on.

This method will be found to effectually break up the static electrical charge pervading the surface of the wax mould, liberating the surplus black lead, so that it may be readily washed out and removed.

The only precaution is to use a moulding composition containing no pitch or resinous gums. It will not attack pure ozokerite wax, or gum chicle, which may be used in the proportion of five pounds of chicle to fifty pounds of ozokerite.

This composition will withstand the action of the annihilator and makes a very good moulding composition as well.

The action of this simple annihilator upon the electrical charge pervading the surface of the wax mould, depends primarily upon the sudden evaporation or release of a portion of the gaesous elements contained in the mitxure, which produces a very appreciable fall in the temperature of the remaining liquid on the surface of the wax mould. By passing a blast of warm air over a quantity of this fluid on the surface of a mould the writer has developed cold sufficient to crack the surface of the wax.

The sudden evaporation due to the liberation of portions of the gaseous elements of the fluid is due to the instability of the mixture in its atomic structure or composition, and to the fact that substitutions are made in this composition.

The methyl alcohol is a saturated hydro-carbon bound or held together by the affinity of the carbon for oxygen. If we introduce into the compound some other element having an affinity for oxygen which, under certain conditions, may become stronger or greater than carbon, then it is possible to cause a separation of the oxygen from the hydrogen carbon compound, with a consequent liberation of the hydrogen and the formation of a new compound. Thus, if we are able to combine salt with the wood alcohol, which is methyl alcohol, and expose it to the air in a very thin layer or strata, so that a sudden expansion of its vaporous elements may take place allowing them to separate forming new combinations or escaping into the atmosphere, produces the desired dielectrification of the surface of the wax mould by the sudden chilling of the surface of the wax.

When we add salt, or sodium chloride to methyl alcohol, we produce an unstable compound. As salt is insoluble in the alcohol itself, it must first be dissolved in water and the alcohol added to the water, which adds to the composition more hydrogen and oxygen, which does not increase its stability.

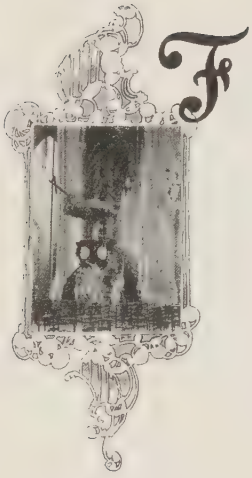
As previously set forth, the compound is purposely made unstable with the following results. Sodium chloride attracts the oxygen and unites with it, not only absorbing that from the methyl alcohol but also that combined with the hydrogen in the water, forming sodium chlorate and liberating hydrogen from two elements of our solution. By the liberation of hydrogen from the methyl alcohol it is changed into ethane, which also escapes in the form of gas or vapour. The only substance left on the surface of the wax at the completion of the operation is a very slight deposit of sodium chlorate, which is washed away when the mould is washed out under the pump. The chemical action which takes place may be expressed as follows, $NaCl+H_2O+2(CH_3OH)=NaClO_3+H_4+(CH_3)—(CH_3)$.

It is very necessary to keep up the alcohol in this solution as fast as evaporation takes place. Water should seldom be added, and should be saturated with salt first. To be able to keep the solution to a standard a hydrometer, known as an "Alcoholometer," is necessary. Keep the solution "annihilator" between 75° and 80° on this scale. Never allow it to fall below 75°.

The writer has applied for letters patent covering this "Electric Annihilator" in the United States of America.

The Graphic Plate.

By J. GASKIN WOOD.



St. Bavon Cathedral, Ghent.

Photo by Chappelow & Co. Godfrey Bingley.

FOR some time I have been using the above plates for reproduction of old MSS., and when used in conjunction with Watkins' meter, there never need be a case of failure, provided you know what can be done with the plate and what can be got out of it, when you know how to use it, and how to develop the image when exposed.

I have a letter beside me just now from our mutual friend the Editor, in which he says: "As regards the speed of the Graphic Process Plate, we may say that they correspond to 9 on the Watkins' meter system." Quite true, that may be so when used with certain developers, but is it always so? I for one do not think it. Let me give you an example. I exposed two or three dozen ½-plates in different libraries, calling the plate speed Watkins' 25 and developed them with Merck's pyro-soda developer, which is as follows:—

Pyro	3½	drams.
Soda sulphite	6	drams.
Citric acid	15	grains.
Water	5	oz.
Potass Carb.	1	oz.
Soda sulphite	2⅙	drams.
Water	5	oz.

For development, 1 part of each to 10 of water.

With this developer, and taking the plate speed at 25, every plate should give a first-class fully exposed negative, fully developed in about four minutes. But recently the writer has been experimenting with a developer which alters matters somewhat. A new batch of Graphic Plates arrived a day or so ago, and the following test made. Plate batch 4081, size ½-plate, Watkins' actinometer 12 seconds, plate speed 9, subject number 1, diaphragm $f/6{\cdot}5$, exposure 1 second. Being desirous of testing this new developer to its utmost, the exposure was made with compound shutter which is guaranteed to be accurate, the exposure given being $\frac{1}{50}$ of a second and developed for about 4½ minutes. This was equivalent to calling the plate speed $9 \times 50 = 450$ Watkin's. The developed plate has been forwarded to the Editor along with the bottle of developer used. This developer will be placed on the Market by Messrs. J. Lizars as "The Challenge Developer," and I believe this bottle will make the Editor alter his opinion regarding the speed and capacity of the wonderful Graphic Plate.

Vaus & Crampton, Ltd.

Photograph by A. Murray.

" . . . Wanders her Silvery Way."

Art Reproduction Co.

Photograph by Carl Gregor.

The Cottage, Bettws-y-Coed.

Stafford & Co., Ltd.

Inks by A. B. Fleming & Co., Ltd.

The Sleigh Belle.

Automatic Focussing.

By ARTHUR FRUWIRTH.

A Fireside Idyll.

E. Hulton & Co., Ltd. Photograph by E. E. Hindley

IN the Year Book for 1906-07, A. J. Newton writes :—" Focussing seems to me to be a sheer waste of time, so long as one knows the proportionate reduction."

Very true. And as there is no reason why we could not know the proportionate reduction, there seems to be no excuse for ocular focussing. But it was always so, is so, and will be so—a plain matter of fact of our craft. More or less we identify a camera by the man who stands behind it, his head under a black cloth, making mysterious movements, and finally emerging from under it with a sigh of relief. What did he do there ? He focussed. Properly speaking it is not he who focusses, but the lens. What he does is only to search for the hidden focus, to arrest it on his ground glass, but by no means to create it.

Indeed a number of attempts have been made to replace ground-glass focussing by automatic systems, based on scientific principles, but so far nobody seems to have solved the problem in a thoroughly practical manner I mention the patents of Carpentier (1897), Königs (1900), Houghton (1906), and the numerous constructions devised by Frécot. They are interesting, even ingenious, but not practical. The idea to shift by one movement the body of the camera and at the same time the ground glass in opposite directions, involves a mechanical apparatus far too expensive, if constructed with that degree of precision indispensable in copying work. As there are hardly two lenses of identically equivalent focus, the apparatus would have to be of different size with every lens. Neither could it be adjusted to present-type cameras and stands. But granted that by an automatic device of this kind the camera be always in focus, by what means are we to define the correct sizes of our negatives, if not by applying a ruler to the ground glass ? Thus not much is gained.

Older and much more feasible are attempts at automatic focussing by means of scales. The snap-shot camera, with its rudimental, but ever useful, focussing scale, shows the start in the right direction. Why the same principles are not employed to process cameras has always been a mystery to me.

Obviously in scale focussing two distinct moments have to be considered : the scale proper and the " proportionate reduction," as Mr. Newton calls it. Let us consider the second moment first.

The relative proportion between the size of a copy and the negative to be made from it we call ratio of reduction (or enlargement), and express it by a common fraction like $5\frac{1}{2} : 7$ or $3\frac{1}{4} : 8\frac{3}{8}$. This notation of proportions is almost meaningless, as a uniform denominator is missing. We have not far to go in search of one. I mean the notation in percentage values. 7 in. reduced to $5\frac{1}{2}$ in. becomes a 78·6 per cent. reduction, and $8\frac{3}{8}$ in.: $3\frac{1}{4}$ in. a 38·8 per cent. reduction; $\frac{1}{2}$ size is a 50 per cent. and $\frac{1}{4}$ size a 25 per cent. reduction, and so on.

The problem is, by what means quickly to determine the proportionate reduction in percentage values. Ten years ago I constructed and used for a number of years a sort of triangular ruler (similar in construction to Penrose's excellent Scalometer). Other devices, such as charts, may be designed and used to advantage. But nothing can compare in speed, simplicity and mathematical exactness to a systematic tabulation of ratios. For all copy sizes and all reductions from 1 in. to 24 in. at an interval of $\frac{1}{8}$ in. resp. $\frac{1}{16}$ in. I have calculated the percentage ratios to the exactness of $\frac{1}{10}$ per cent.

Having thus completed the first half of the problem (the proportionate reduction) we will contemplate the construction of a proper set of focussing scales.

Without burdening the reader with mathematical formulas I may state that, provided the equivalent focus of the lens be known, for every distance of the lens from the copyboard the corresponding distance from the ground glass (conjugate focus) can be calculated.

Our task is to construct a pair of scales which are in conformity to the tables and their percentage notation, that is, which contain all positions of camera and ground glass for all percentage ratios of reduction at an even interval of $\frac{1}{10}$ per cent. Such a scale has been calculated and designed on paper for an imaginary lens of 60 cm. or approximately 24 in. focal length. The top line of the Scale Chart furnishes the positions for the ground glass, the second line the positions for the camera (lens), between ratios 100 ($\frac{1}{1}$ reduction) and 50 ($\frac{1}{2}$ reduction), after which the scale is broken off and continued on line three from ratio 50 to 33.3, and so on.

What is to be done with this chart in order to produce the working scales for our special lens and camera? It is to be reproduced to the length of the focus of our lens. Not knowing it, the scale-chart itself helps us out of the difficulty. As each line is supposed to represent a focal length and at the same time to fill the space between reductions $\frac{1}{1}$, $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$ etc., all that is necessary is to focus a suitable subject twice at any two of the mentioned reductions. The difference between the two camera positions corresponds to the equivalent focus and determines the size of the working scales. The negative from the chart may be printed on metal in the usual way and etched, the strips sawed apart, trimmed and attached to the camera and stand in proper position.

As yet we have contented ourselves with reductions. At first thought enlargements, if included in the scale system, would require specially calculated tables and scales. This is not so. The relative proportion of the numbers 10 and 5, for instance, remains the same whether 10 represents the copy and 5 the negative or *vice versa*. Consequently, for determining the ratios of enlargement the same tables can be used. The scale for the ground glass positions changes place, so to say, with the one for the camera positions. A second set of scales is prepared from our chart negative and attached to the outfit in continuation of the reducing scales. The complete scale system has then the appearance of Fig. 1.

Suppose now our camera and stand permit of a minimum reduction to $\frac{1}{5}$ size or ratio 20, then a copy may be reproduced to 800 different sizes (not including

positions between the division lines), each of which differs by exactly $\frac{1}{10}$ per cent. Granted a focal capacity of the camera to double size, 500 more divisions are added (up to ratio 50 of the enlarging scale). If a photographer would start to make 800 negatives from a copy 10 in. long, using every division line to his disposition, then each consecutive negative would be smaller by $\frac{1}{100}$ in. If, after a number of years, he would miss a single negative from his otherwise unbroken collection of 800 negatives, he could produce this very negative again without focussing, provided he marked the ratio index on every one, and it would not be smaller nor larger by a hair's width than the lost one.

An operator may be left in complete ignorance as to the particular size of a reproduction and still turn out a negative correct in size. He was guided by the marked ratio index. He may focus a copy without ever having seen it and while the lens is still in the safe. Occasionally he focusses with a match, when the dawn of a wintry day shrouds the scale in darkness. The arc lamps are only turned on for the exposures. Take an average of thirty line negatives a day and half a minute to the exposure. Turn out eighteen half-tones at an even exposure of three minutes, and your electric lights burn no longer than fifteen

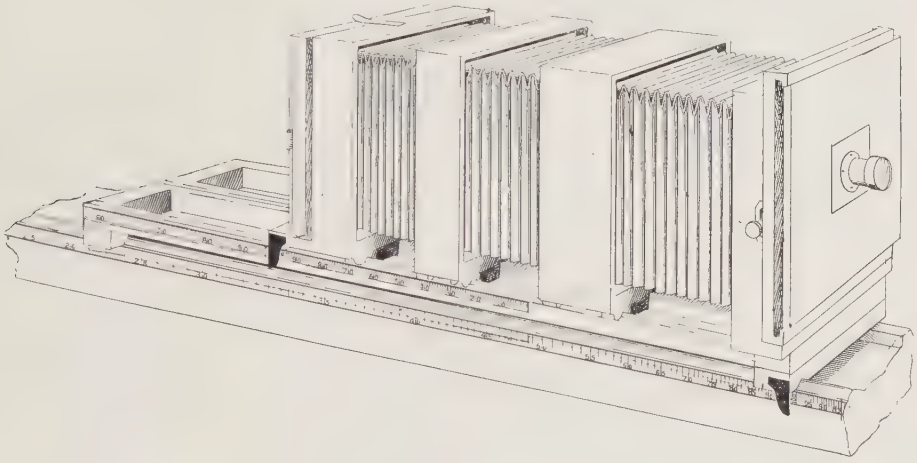


Fig. 1.

minutes on your line and less than an hour on your half-tone camera for a full day's work.

You don't mind undoing a focus just completed and substituting a sudden rush job sprung on you. A little shifting of the camera is all that's needed. You laugh at your neighbour's troubles, when he is in despair over a very fussy copy, and who mislaid his focussing glass, or broke his ground glass or sweats under the cloth at 100° in the gallery.

A series of negatives requiring exact register need not block the camera to the exclusion of other important work. The register is re-established at any after time, in a day as well as in a year. And if the printer had hard luck with one of your high-prized three-colour negatives, you are apt to swear less at him, since the worst trouble of focussing a negative to register size is taken away from you.

These are benefits not to be under-estimated. But they are small compared with the one great advantage of knowing which copies can be bunched together in the same focus. There your real saving of time, labour and material comes

in. You may think all this is counter-balanced by the formidable extra work of looking up the ratios in the tables. You are mistaken. It requires only seconds in a single case, and most of it slips in between other work. Chances are, the office relieves you of it altogether, and so it ought to be. You keep all your copies well ordered in rotation of the ratios, and start at one end of the scales, working by degrees towards the other end with slight shiftings of the camera and proper changes of the stops at certain positions, say ratios 80, 60 and 40. You will also time your negatives more correctly as a mere matter of experience, though you may not know, why the correct time for ratios: 75 ($\frac{3}{4}$), 66·7 ($\frac{2}{3}$), 50 ($\frac{1}{3}$), 33·3 ($\frac{1}{8}$), 25 ($\frac{1}{4}$), 20 ($\frac{1}{5}$) is 77%, 69%, 56%, 44%, 39%, 36% of the time you would give when copying the same line original in natural size.

Very well so far, but does it not put the scales out of commission when a copy extends over the surface of the copyboard, for instance, a heavily mounted photo, a book, an oil painting? Of course it does, but you remedy that in no time by shifting the camera back from the proper ratio by the same amount, for instance, $\frac{1}{16}$ in., $\frac{1}{4}$ in., 2 in., as the case may be. Even real objects, unless of complicated form may be scaled in eight out of ten cases with a little common sense and experience.

If you are an inquisitive sort of reader who likes to dig into the very depth of things, I could give you an answer to questions like: How about the common practice of "spreading the focus" as applied to scaling? What influence is attributed to a cover glass over the copy or the interposition of a half-tone screen? How behave lenses badly afflicted with astigmatism and curvature of field? What steps are to be taken, when changing the lens from the front board to a cone or putting it inside the camera? Can scales be used with ray filters with and without prisms? Does the temperature affect the scale focus perceptibly? These are quite interesting questions and I would like to satisfy your curiosity were it not for Mr. Editor's impatient frown. That settles it.

Old Sicilians.

Western Mail Ltd.

Photograph by S. J. Beckett.

Bourne & Co.

Photograph by Ellis & Walery.

H. B. Irving in "The Lyons Mail."

H. Rheinlander & Co.

Photograph by E. O. Hoppé.

The Artist.

THE CASTLE OF CHILLON.

"Chillon! Thy prison is a holy place,
And thy sád floor an altar,—for 'twas trod,
Until his very steps have left a trace,
Worn, as if the cold pavement were a sod,
By Bonivard!"

From the Painting by Jas. A. Kingston, Esq.

Tri-Colour Blocks & Printing by Taylor Bros., Leeds.

Photo by Langfier, London.

Block by Ashworth & Meredith

The Captain of the Galley Slaves.
In "Ben Hur."

W. F. Sedgwick, Ltd.

Photograph by J. E. Tyler.

The Shepherd.

A Simple Method of Regulating Exposures.

By CHARLES GRAVIER (Paris).

(*Translated by E. D. Cyfer.*)

A Summer Snapshot.

Manchester Wood Engraving Co., Ltd. Photograph by K. F. Bishop.

In the course of several years' experience it has been found that when using an antihalo, one can develop automatically, with a suitable developer, a series of impressions of which the most intense is the result of an exposure that has been 100 times longer than the weakest giving a complete picture. The plate still remains translucent and gives a good picture.

Colonel Houdaille has proposed, in determining figures for the velocities of shutters and a given diaphragm (f 6·3), to establish three conditions for exposure:—1, The subject being lighted directly by the sun = 1. 2, The subject in the shade, but well lighted = 8. 3, The subject in the shadow, but badly lighted = 4. For the dull season these figures have to be multiplied by four.

I have made many trials with the ordinary so-called "rapid" and "extra rapid" plates on the market, with a shutter indicating a verified speed of $\frac{1}{50}$th of a second, and I have a great number of plates showing, by a series of ten prints from the same plate, that at the speed mentioned above, the "rapid" plates of commerce start yielding a weak but finished plate, with a diaphragm $f/45$ of a subject lighted directly by the sun in $\frac{1}{6}$th of a second, and in the shade, but well lighted, in a minute; which indicates respectively a diaphragm of $f/11{\cdot}3$, $\frac{1}{96}$th of a second and $\frac{1}{16}$th of a second for the plates called "rapid."

From a practical point of view I thought of proposing to accept the figures of Colonel Houdaille, which are much superior to those of my numerous trials, part of which I have presented to the French Society of Photography. Consequently I have made up the table below, and for its use I propose the following method for outdoor photography (landscapes, monuments, etc.).

Time of Exposure Outdoors in Seconds.

Coefficient of transparency	0·20	0·31	0·39	0·64	1·28	2·56	5·29	10·2	20·2
f/d	4·5	5·6	6·3	8	11·3	16	23	32	45
Sun	$\frac{1}{250}$	$\frac{1}{160}$	$\frac{1}{128}$	$\frac{1}{80}$	$\frac{1}{40}$	$\frac{1}{20}$	$\frac{1}{10}$	5	$\frac{2}{5}$
Shade, well lighted	$\frac{1}{32}$	$\frac{1}{20}$	$\frac{1}{16}$	$\frac{1}{10}$	$\frac{1}{5}$	$\frac{2}{5}$	$\frac{4}{5}$	2	3·2
Shade, badly lighted	$\frac{1}{8}$	6	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{3}{4}$	$1\frac{1}{2}$	3	8	12

The above figures will have to be multiplied by 4 from November till February,

The speed of the shutters should be verified, as the indications are most fantastic. In London the firm of Beck only charges 6d. for this verification, by suitable apparatus, for one or two velocities, which is sufficient, for instance, for $\frac{1}{10}$th and $\frac{1}{50}$th of a second.

Being given the latitude which I have stated above for obtaining a useful plate and the table I have drawn on the figures of the diaphragm *f*/6·3 of Colonel Houdaille, I can affirm that a useful plate is always obtained by the formula of the "Perfect Developer" of the chemist Mercier, which we give herewith (for the developers of Lumière, Reeb, etc., the directions of the makers have to be consulted).

Ordinary water	1,000 c.c.
Crystallized sulphite of soda	80 gr.
White hydroquinone	8 ,,
Pure crystallised carbonate of soda	60 ,,
Bromide of potassium	5 ,,

(Automatic development in ten minutes.)

For photography indoors, with the same method of development, we herewith give the approved method which I propose for commercial plates.

Adjust the focus with the largest diaphragm, examining the detail in the dark parts attentively; reduce slowly the diaphragm until the detail is hardly visible,* but distinct notwithstanding; use the second diaphragm for exposing. Whatever be the diaphragm employed, the exposure must be invariably twelve minutes for the "extra rapid" plates, and fourteen minutes for "rapid" plates.

If a shorter exposure should be required it would be sufficient to divide these figures twelve and fourteen by the proportion between the empiric diaphragm found and a larger diaphragm; if the first one is, for instance, *f*/16, twice less than *f*/11·3 has to be employed, or four times less than *f*/8, etc.

I would like readers to make a trial with these two methods and to let me know the result.

These results from the latitude which one has during the exposure, using an anti-halo and the automatic development of ten minutes, that a speed double or half less than the one indicated for each diaphragm on the table, without my method losing its degree of practical use. This simplifies the commercial graduation of the shutters.

I have had the little tube known as the "Duhe" modified by an optician, and this will enable, at the same time, the distance of the subject to be photographed and the diaphragm to be used. It will thus aid photographers, whose apparatus has a fixed focus.

As the reader will have been able to see I have arrived at the simplified method which I have first indicated after having verified the great latitude in the degree of exposure. I consider it useless to put forth the details of my former experiences. However, I remember an interesting one.

On one and the same plate I have obtained eight different "clichés" with a shutter having a uniform speed of $\frac{1}{50}$th of the useful speed in the following manner: Before a monument of a clear yellow colour, having twenty windows with figures painted on them in white, and a cornice throwing a shadow, with corbels in this shadow, I have placed my apparatus (between 1 o'clock and 3 o'clock) with the sun lighting the monument, and I opened the shutter eight successive times, increasing each time the diaphragm and augmenting the speed

* It should be observed that it will be necessary to remain one or two minutes under the cloth in dark, in order to be able to see well.

of the shutter by $\frac{1}{100}$th each time it was opened. The part of the plate not covered by the shutter had thus received the impressions of $8-n$ (n being the number of openings already effected), and this ultimately comes to the following :—

Diaphragm used	*f*/45;	32;	23;	16;	11·3;	8;	5·6;	4·5
Relation of the areas	1;	2;	4;	8;	16;	32;	64;	123
Useful corresponding impressions	1;	3;	7;	15;	31;	63;	127;	255

The impression of *f*/45 is nil, but from *f*/32 to *f*/4·5 there are seven clichés more and more intense, but of use with the extra rapid plates, and from *f*/23 to *f*/45 with the rapid plates (the former being very weak). However, *f*/4·5 has thus received 255 times the impression of *f*/45. Of the experiments made with plates of all the French manufacturers as well as on account of my old experiences, I come to the following proposition :—

For the apparatus of which the largest diaphragm is *f*/10 or *f*/14 the shutters will only have two absolutely useful speeds, $\frac{1}{10}$th and $\frac{1}{40}$th of a second; for apparatus having diaphragms higher than that a speed can be added, useful and absolute, of $\frac{1}{100}$th second; but it will rarely be used.

One would say to photographers: If you always wish to obtain a useful cliché act as follows for outdoor photography. If the subject is in the sun take the speed of $\frac{1}{50}$th and the diaphragm *f*/16, the largest diaphragm (with the higher diaphragm a sharper negative will be obtained). If the subject is in the shade but well lighted, take the speed $\frac{1}{10}$th to start with, *f*/10 at the largest diaphragm. For the shade, badly lighted, consider the subject to be taken as being indoors.

I would just mention the fact to photographers that the exposure is of a rigid exactness. Apparatus is sold in which he can find up to thirty-five speeds and eight diaphragms, and in consequence 280 times of exposure !

THE HARBOUR, VOLENDAM.

GEO. NEWNES, LTD. Photograph by W. GAMBLE.

How to Use the Fixed Screen with the Best Result.

By CHAS. J. HARRIS.

Design and Block by PHILIPSON, SON & SKILLETER. Photograph by F. W. TASSELL.

CONSIDERING that there are many operators who use their screen at a set distance from the plate—usually carrying it in the dark slide—it may not be at all out of place to say a few words on a simple method for finding the correct size of the stop necessary for producing the best gradation of tone ; and a method whereby it can be determined without loss of time, and without unnecessary trouble.

Many men make a rough guess at it and determine it by judgment, but it is well known that the wisest and most careful are liable to misjudge ; especially is this the case in times of great stress, just when an error of judgment is most fatal. I, therefore, give the following method for finding the correct size of the stop.

Find the exact distance of the *screen ruling* from the plate ; which, in this case we will give as a quarter of an inch.

Then discover the aperture of the screen, which would be, when using the 100 line screen, $\frac{1}{200}$th part of an inch.

The size of the stop must be in the same proportion to the camera extension as the screen aperture is to its distance from the plate.

It will be seen that the proportion of the screen aperture to its distance from the plate in this instance is $\frac{1}{50}$th, therefore if the camera extension was 25 inches—measuring from the stop to the screen—the correct size for the stop would be half inch.

If this method is carefully worked, it will be found that the best possible results can be obtained without the risk of spoiling many plates ; the operator will know just what the dot effect will be before he starts and he will be able to get an uniform negative, which is a great advantage.

Messrs. Penrose & Co. supply an adjustable stop, I believe, which saves a great deal of trouble.

The Grout Engraving Co.

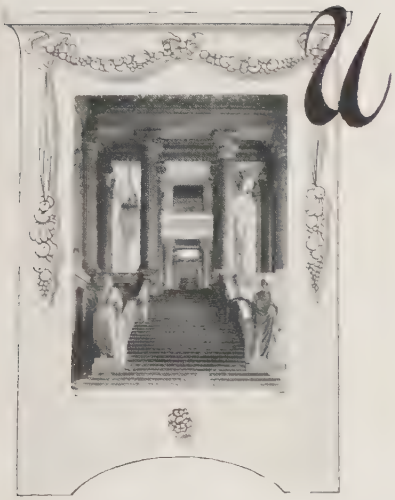
Design by The Carlton Studio.

The Critic.

(By permission of Messrs. Stewart Dawson & Co.)

The Passing Show.

By LOUIS FLADER (Chicago).



PALAIS DE JUSTICE, BRUSSELS.

THE DEAN ENGRAVING CO. Photograph by GODFREY BINGLEY.

UNCLE EBEN, or some other Ethiopian celebrity, once delivered himself of the axiom "The sun do move." This expression has been regarded as an evidence of progress ever since. While the engraving industry on this side of the pond has been in a comatose condition for a number of years, so far as evolution and progress is concerned in the last twelve months, we may truthfully say "The sun do move." A healthy development is taking place all along the line. Formerly the engraving equipment and work-rooms of American photo-engravers were notoriously bad when compared with those of Europe, there is now a decided tendency toward improvement. Engraving house proprietors are actually spending money and devoting space and time toward furnishing their workmen something to work with. Colour work is developing rapidly, the greatest innovation in that branch being the introduction of a collodion emulsion which really produces work in America. For a number of years we have been entertained with volumes of mythical narratives describing the wonders accomplished with collodion emulsion *in Europe*. A number of optimistic and trusting engravers listened to the magic lore of the European expert's lute in the hope of participating in the wealth and glory said to follow in the wake of collodion emulsion. A number of men visited our shores and, while they partially succeeded in isolated cases, their efforts as a whole were futile. It was finally decided that collodion emulsion could not be utilized in America owing to climatic conditions. That theory became the accepted one and there matters stood. A little over a year ago, two young men, Freundorfer by name, hailing from Munich, Germany, arrived in New York and introduced a collodion emulsion which they thought could be used with success. They set out to prove their claims and did it amply. They have demonstrated beyond the shadow of a doubt that collodion emulsion can be worked successfully in America, or Timbuctoo, for that matter, providing the operator understands it. There are now perhaps a dozen firms in America using collodion emulsion, and all report nothing but success. I can testify from personal observation that it exceeds all claims made for it. Chicago climate is not exactly what might be termed "salubrious," yet the Barnes-Crosby Company has operated collodion emulsion for three and four-colour work since its installation this spring. Not one dry plate has been used for that purpose in the meantime. It works equally well during wet, dry, hot or cold weather.

Of late we have heard a number of extraordinary claims made for a dry plate produced by an English firm for use in direct colour half-tone negative making. If these claims can be substantiated, you certainly lead us. However, seeing is believing. We are indebted to England and Continental Europe for the collodion emulsion process, and it is possible that you will add to this debt of gratitude a perfect dry plate for colour use.

We are all of us more or less startled by the rapid strides made in the offset press method of illustrating. There are four or five different firms manufacturing these presses in America, and all seem to find a ready market for their wares. Up-to-date we have seen but very little work of any nature produced by offset presses that can be compared to photo-engraving and letterpress printing products, and not suffer by the comparison. It's a new article and undoubtedly attracts people because of its newness. Being in reality a photo-lithographic process, it will only be developed when lithographers and photo-engravers co-operate and combine their efforts toward the common goal of perfection. Just so long as each works in his own way, and secretly at that, there will be very little progress made. The theory is understood by both ; all that is lacking is practice in the application of the mechanical functions, etc.

Another startling innovation is the rotary photogravure process. This press and the plates which are printed upon it, we are given to understand, have been known in Europe for a number of years, but are comparatively new to us. Half a dozen inventors and discoverers are running riot claiming great and wonderful things for their methods. Their claims consist chiefly of the statement that plates can be made at a very low cost and the printing can be done at the rate of from four to six thousand impressions per hour. Nothing much will be done with this process until it is made public and generally understood. At present the work is carried on behind lock and key and is surrounded with much mystery. At all events, it gives us something to ponder over and has a tendency to compel photo-engravers to exercise their ingenuity and skill to keep up with the procession.

Photo-engraving as a business is no better to-day than a year ago. The demand for illustrations and engravings is still increasing. On the other hand, the increase in the number of firms who supply this demand, is way out of proportion to it. Our so-called " colleges " of photo-engraving are conducted for profit pure and simple. This results in a large number of inexperienced and incompetent " photo-engravers " being placed upon the market. From three to nine months is declared by the colleges to be sufficient time to learn the trade. At the expiration of the course, students are naturally compelled to make a living. In their efforts to secure employment, they travel through the land, accepting positions at whatever compensation is offered, and, as a rule, unable to earn that. A good many of the students are young men of some little means, and after a period of idleness or employment at very low wages, launch into business themselves. This has brought out an entirely new line of competition. Being neither craftsmen nor business men, you can understand the difficulties confronting an organized illustrating and engraving establishment when facing such competitors.

I have recently read a number of complaints from English photo-engravers against the low selling price of engravings. Less than a week ago, I heard of an instance where copper half-tones are sold in the city of Chicago at the rate of five cents per square inch, by just such a firm as has been formerly described. Then again, there is another side to it. Extremely low prices cannot mean anything but quality even lower than the price. While a certain number of buyers regard price as the paramount issue, there are in every community business men wise

enough to pay a good price for good work. Any firm conducting its business along business lines with an organization competent to render service, and provide "Quality" work and that only, has no difficulty in securing legitimate profits.

The employing photo-engravers of America as a whole seem a very inconsistent lot of men. They have been and are carrying on an agitation toward increasing the price of their products and mean to bring this about through a campaign of education. A movement is on foot to teach their colleagues the cost of production and to that end facts and figures are submitted. The intention is to bring proprietors face to face with the fact that they lose money on every cut of certain proportions, to jar them out of their state of coma and compel them to raise prices. This procedure would perhaps have a good effect were it not for the lamentable fact that among the strongest agitators for higher prices and the veiled prophets of cost systems, we find the most persistent and viscous price cutters. Everybody has watched everybody else perform for a number of years and the majority feel that "no good can come out of Nazareth." Knowing each other as well as they do, they are just a trifle "leery" to use the Bowery vernacular, and while they agree to any scheme that is sprung, they are quite careful not to put it into operation.

The workmen still maintain their union, which has about reached its height of efficiency so far as wages and working hours are concerned. A labour organization, like any other community of interest, is founded upon the motive of gain. Great enthusiasm and loyalty is tendered to the cause in its early stages when there is nothing to lose and a great deal to gain. After the immediate desires are satisfied, interest lags and the very men who five years ago would gladly consent to strike, for what they termed their "principles," will to-day consider the matter in an entirely different light. Five years ago this so-called "principle" meant an increase in wages and a reduction in working hours. To-day no material increase is possible. They figure that since they can hold their positions on their individual merits, it is useless to make a sacrifice jointly for the same purpose. Union accomplishments in the last year consist largely of holding what they had, no appreciative increase or advancement being secured anywhere. There is more or less unrest in the ranks over the new methods of illustrating and engraving dealt with in the first part of this article. The men are determined to permit no encroachments upon what they consider their rights.

In defence of this principle, the photo-engraving industry in the city of San Francisco was recently paralyzed for thirty days, the cause of the trouble being the introduction of a patent base. Several of the newspapers installed the patent base, which consists of a number of units of different sizes. They are assembled by the employees in the composing-room, who place the etched plate upon the base and lock up the form. This method eliminates the making of wood or metal blocks, and consequently deprives photo-engravers of that much work. The patent base referred to is a progressive step. Photo-engravers of San Francisco devoted thirty days of their time and considerable money to learn this fact. They gained nothing but their experience and the knowledge that progress cannot be stopped, or even seriously interfered with.

The union is doing an excellent work in behalf of its tubercular members and deserves credit for it. Aside from providing medical assistance and sanatorium accommodations for its afflicted members who are unable to work, a strong agitation is continuously carried on in behalf of better shop conditions, ventilation, sanitation, etc.

Taken altogether, American photo-engravers must sooner or later face an elimination process. It would be here right now but for the fact that after a

period of inactivity, the settlement of the tariff question has imbued Americans with a great desire to break all records in the point of manufacture and sales. They appreciate the necessity of illustrations and engravings of the highest quality in conjunction with their sales efforts. This has caused an unusual demand for our products at a good price for the right kind. A comparatively short period will demonstrate the permanency of this condition. Competition will continue to grow keener and keener and the next business depression is bound to number among its victims some of our co-labourers. May that day be long deferred.

THE BROKEN MELODY.

Electrotype by
W. G. PROVERBS, LTD.

Original Block.

Electro No. 3, taken from Electro No. 2.

Robert Kett "the Tanner" under the Oak of Reformation.

Eyre & Spottiswoode, Ltd.

Electro No. 2, taken from Electro No. 1.

Electro No. 1, taken from the Original.

Robert Kett "the Tanner" under the Oak of Reformation.

Examples of the "Albert Galvano" Process.
(See note in Editorial Article "The Year's Progress.")

London and Provincial
Reproduction Co., Ltd.

Inks by A. B. Fleming & Co., Ltd

John Bull.

From a design by The Baxter Studio

Photo-Lithography and Half-Tone Posters.

By R. E. WILKINSON.

"THE MURMUR OF THE SHELL."

Photograph by GRAYSTON BIRD.

A. E. DENT & CO., LTD.

WHAT photography and the Levy screen has done for the letterpress printer it can without doubt do for the lithographer, but at present he blocks the way somewhat and resents the invasion of photography instead of encouraging it. This is a great mistake and quite British, especially when it is entirely understood by the craft that the letterpress printer, by the aid of the three-colour block, is capturing more work every year from the lithographer, because with their present methods the latter simply cannot compete with three-colour.

Lithography, in these days of progress, stands almost alone as a process which has not moved with the times. As a recent writer has pointed out, "It stands almost as Senefelder left it 100 years ago, with the exception of Day's Mediums, the only modern introduction for the purpose of reducing the number of printings and the cost of production."

It seems, therefore, that as a process lithography is absolutely incapable of further improvement. It has reached finality, because not even Day's Medium can enable it to compete with three-colour blocks.

Therefore, if the craft have any desire to escape comparative extinction, they should welcome the help that photography can give rather than resent its invasion. It is only reasonable to assume that photography by the aid of the Levy screen and the Metzograph screen can give the lithographer valuable assistance if he will accept it and wed it to his usual methods with the deliberate object of simplifying the process and reducing the number of printings, thus enabling him to compete with three-colour blocks.

I am firmly persuaded he could do this in many cases very successfully, when we come to consider on the one hand the cost of the initial three-colour blocks and the inevitable electros necessary for a long run (to say nothing of the costly make-ready), and on the other hand the facility of making up large stones by re-transfer possessed by the lithographer. I am fully aware, however, that in dealing with screen work this question of re-transfer constitutes the most serious problem (though some transferrers make a trouble of it and some do not). But that will, without doubt, be overcome in time, especially if the lithographer and photographer work hand in hand. Practical workers are fully aware of the many problems to be solved in connection with half-tone photo-litho., and feel very much the need of co-operation, which must be whole-hearted on the litho. side, to make it successful.

In this as in many other things England is lagging behind the Continental lithographers, who, we are told, are making extensive use of photography. Visitors to the Austrian Exhibition at Earl's Court some four years ago could not but admire the beautiful specimens of chromo-lithography which were admittedly produced by the aid of photography. And at the Dresden Exhibition held during the past summer, a reviewer remarks in the *British Journal of Photography* on "The very large amount of combination work in which photography has aided lithography."

What is being done in Britain the writer is not in a position to know exactly. Several processes and methods have been patented and exploited during the last few years, but have been dropped. The principal reason being no doubt the antagonism on the part of the trade, which makes it difficult to get a new process a fair trial. It must. however, be noted that the majority of suggested methods deal with small work, in which so many difficulties crop up. These, as I have pointed out above, can only be conquered by the photographer and lithographer working in harmony.

In large work, however, up to 60 by 40, the half-tone screen is very useful, and judging from the number of posters displayed on the hoardings during the last few years, obviously made by the aid of the screen, it seems as though the half-tone photo-litho poster has come to stay.

The writer having been engaged in this work for some years, the Editor suggested that a short description of a poster plant would be of interest to his readers.

The type of camera adapted for the production of large negatives is known as a room camera, that is to say, the dark room itself is the camera.

The plate-holder, which moves on floor rails to get the necessary extension for enlargements, has an arrangement which enables it to take any size plate from ¼-plate to 72 by 52 without the use of carriers. The use of a dark slide is entirely avoided and all unnecessary handling of the sensitive plate. This is a great consideration in the case of all large sizes. I may say in passing that this type of camera is extremely useful in any photo-mechanical works, as anything can be done on it, even bromide enlargements.

The copy-holder and arc lamps are, of course, placed outside the dark room, and the bellows and camera front are fitted to a square opening in the partition. These are attached to a heavy base, and, along with the copy-holder, slide on floor rails identical with those in the dark room for the accommodation of the plate-holder. The copy-holder has an arrangement whereby it can be quickly adapted for transparent or flat copy.

The dark room, in addition to the plate-holder, contains a sink 8 ft. by 6 ft., and the silver bath holder. This is strongly constructed and made to rock on a specially designed stand. It has a well to contain the silver solution when in an upright position for draining the plate. It will take a plate 72 by 52, but for smaller work two other baths of the same type are in use—44 by 34 and 32 by 26.

For handling all plates over 40 by 30, an appliance known as a coating jack is used. The printing frame, adapted for both paper transfers and metal printing, is of the pneumatic order and mounted on a strong stand and castors for transit purposes.

A rolling-up table for both paper and metal and a soaking-tank completes the equipment as far as the work-rooms are concerned. But mention should have been made of screen gear for the room camera and the indispensable Levy and Metzo. screens and Cooke lens.

The Life in Solids.

By C. S. BEST.

THE BEACON.

HALF-TONE ENGRAVING CO. Photograph by F. N. TIPTON.

IT has been an unconscious habit in the past to consider most solids as dead matter, and even if they can, by being subjected to different conditions, be transmuted into liquids, they are still classed by the ordinary thinker as "dead matter." It has, as most of us now know, been proved that metals can be poisoned by subjecting them to various poisonous substances.

Just as the life of an animal is taken by arsenic, so is the life of a metal destroyed by its being subjected to conditions which do not harmonize with its nature. We have perhaps to consider what the "life force" is before we can get a clear idea of the nature of the destruction that takes place. In the animal the change that takes place is shown by the fact that it no longer responds to most of the outward stimuli by which it was previously affected, and also that the atoms by which it is built up no longer hold together, but gradually disintegrate. Can we not apply these same ideas to metals? Under careful observation it is seen that metals have a constitution of their own in the same way that animals have, and that this can be injured or destroyed before the life of the metal is really lost. Let us take the metals most familiar to the printing world. What is habitually called "quality" may, in many cases, be "the constitution" of the metal. It is well-known that the variability of various samples of zinc, copper and stereo metal differs greatly.

Do we, as workmen, consider how most of that variability of constitution is brought about? In the above metals it is mostly brought about by heating. Zinc becomes more granular and soft, *i.e.*, it loses its power of tenacity, its power of holding the atoms of its make-up tightly and closely together, and so they easily fall asunder, yet at the same time retain the same chemical formulæ. When this has occurred we find that it wears out very easily. May it not be that we have driven out some of the "life forces" that hold them together? Let them be called magnetic, electric, or what you will, the result will still be the same. The same occurs with copper, but to a less extent. With stereo metal, that now so popularly called 'Dalziel' is a judicious mixture of lead, tin,

and antimony, so that it forms a good hard-wearing metal, *i.e.*, so that the "life forces" specially suitable to each metal are so combined that the atoms of the metal are held very tenaciously together, and those atoms in themselves are very hard in their nature. It must not be taken that the atoms lose their individual nature. Is it possible that they so arrange themselves, that the life forces are suitably arranged so as to form a tenacious, hard substance? In the case of a hard brittle substance is it not possible that the wave length of such "life force" is short, and in the case of malleable metals, the wave length long? The most important thing, it seems to me, is for all users to realize that the life of a metal may be driven out by wrong treatment, and that heating to too high a temperature is the greatest cause of the "bad quality" in most of the metals, and particularly in the above-mentioned metals. The point to realize is that the metal we are using may be alive or it may be "a corpse."

If we could only appreciate these ideas, the question of the treatment of the metal used in making printing blocks, in their various phases of manufacture, would be much more carefully watched, particularly with regard to heating the metal during the production of the block.

A Run on the Shore.

Half-Tone Engraving Co.

Photograph by
Azuley Wallace & Son.

E. Hamel & Co

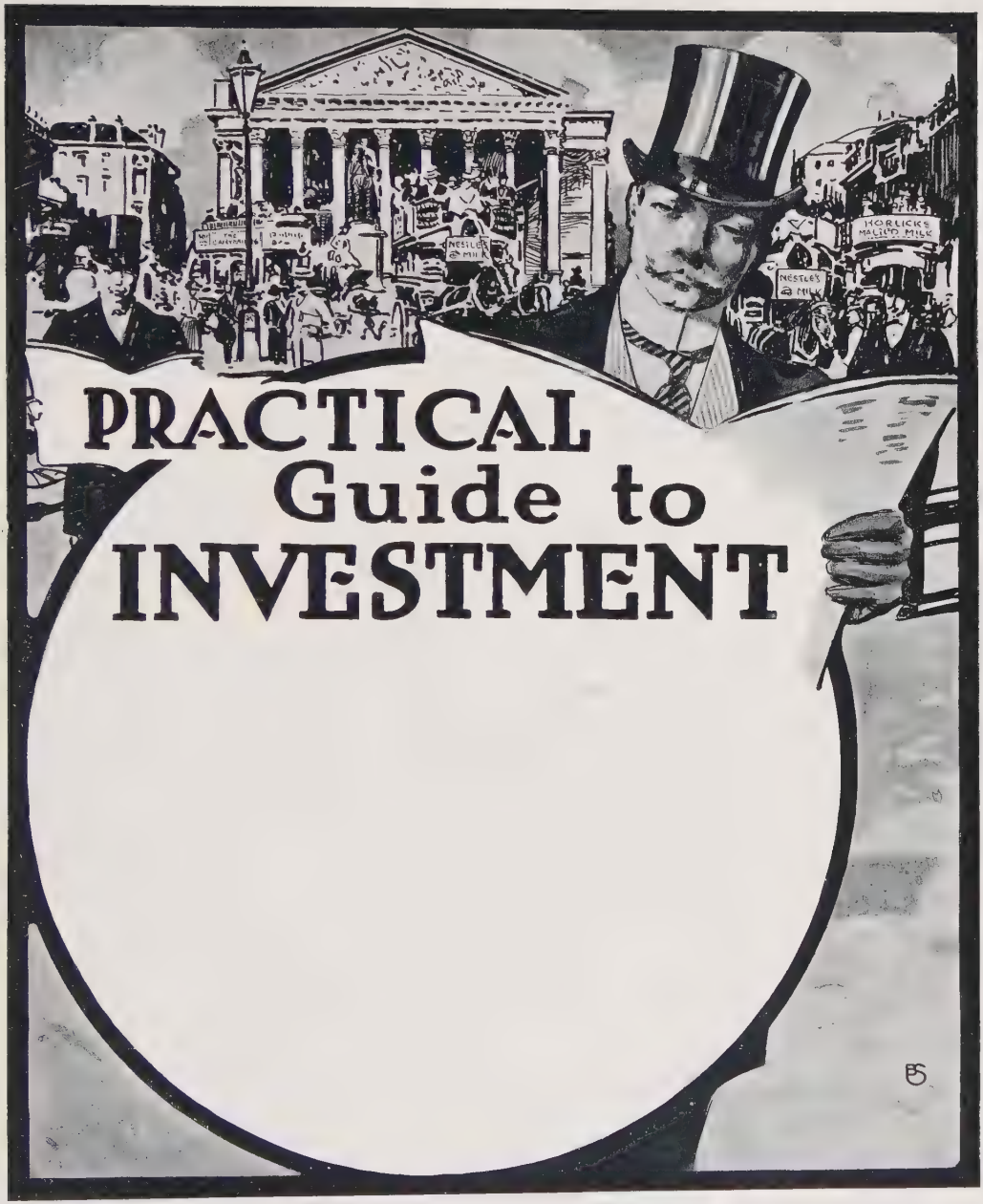
"After Guido."

From an original, the property of the [illegible]

A. E. Dent & Co., Ltd.

Design by The Carlton Studio.

A Cover Design.



Acme Tone Engraving Co., Ltd.

Design by the Baxter Studio

An Advertisement Design.

Reproduced by the "Acmetint" Screen.

The Walker Engraving Co. *Design by the Carlton Studio.*

A Pencil Study.

The Direct Photo Engraving Co., Ltd. *Design by the Carlton Studio.*

A Magazine Advertisement Design.

Kleboe and Franklin.

A Catalogue Page.

The grouping of several subjects on one plate, surrounded by a tone border, gives the page a pleasing decorative effect, and reduces cost of printing a number of small vignetted blocks.

We rested at night with five hundred guards on each side of me, half with torches, & half with bows & arrows.

Half-Tone Engraving Co. *Inks by C. Lorilleux & Co.*

Illustration to "Gulliver's Travels."
Design by the Carlton Studios.

The Rehabilitation of Lithography.

Modern Mastery of "Metalithographic" Processes.

By JOSEPH GOODMAN.

LIFE'S TWILIGHT.

ARC ENGRAVING CO., LTD. Photograph by F. N. TIPTON.

DEALING again this year with the interesting theme of those remarkable epoch-making, and revolutionary accomplishments of modern lithography—those that are now becoming so rapidly absorbed, and profitably established in this versatile old art craft of the graphic realm—we hasten to pay due credit to the very vital and all-important rôle which the later metalithographic methods have contributed in bringing this about.

Inseparably bound up with these triumphs: and in fact the very heart core of their creation, is the indispensable part played by the two metals "aluminium" and "zinc" respectively.

Although zinc has had a most chequered career for upwards of a century as a printing surface in lithography (even from the time of Senefelder),—it being at times almost entirely banished from active use, and then again revived by new and more promising prospects, such as the introduction of "calcareous layer coatings" deposited upon its surface: yet it never became really formidable as a rival to the old-time lithographic stone, until spurred on by the advent and partial success of a new metallic rival in the form of "aluminium plates."

The technical innovations then and there introduced with aluminium, both from the "mechanical" and "manipulative" sides, again directed attention to this older metallic love of lithography—"zinc." The prolonged experimental outcome of this now is that the zinc plate lithographic process of to-day has been brought to such a remarkable state of perfection, embodying new and more valuable accomplishments, the intrinsic merits of which are unattainable by the metal aluminium, which is now being gradually displaced by the usurping metal—"zinc."

It may seem remarkable that a century's practice should have transpired before the present satisfactory result could be attained; but that is only another example of the marvellous changes and perfect accomplishments, which time and persistent perseverance will eventually complete.

In reviewing these developments, we are constrained to recognise that both

natural and artificial considerations have exerted their respective influences to bring about this result.

On the "natural" issue there has been the gradual decline in the quality and character of the lithographic stones as quarried in recent years for the lithographers' use ; thus making it much more difficult than heretofore to attain the same high-class results in printing, without the expenditure of much extra labour and time : which from an economical and commercial standpoint was unprofitable.

On the "artificial" side there was the ever-prevailing desire to expedite production by the use of less cumbrous methods than what the litho stone afforded.

Furthermore the fast competitive rivalry of the sister branch of the printing art, "typography," with its ready, eager adoption of the "photo-mechanical" methods of relief printing, has also acted as a stimulus in the advent and adoption of these new powers, which have now so signally enriched the whole lithographic art.

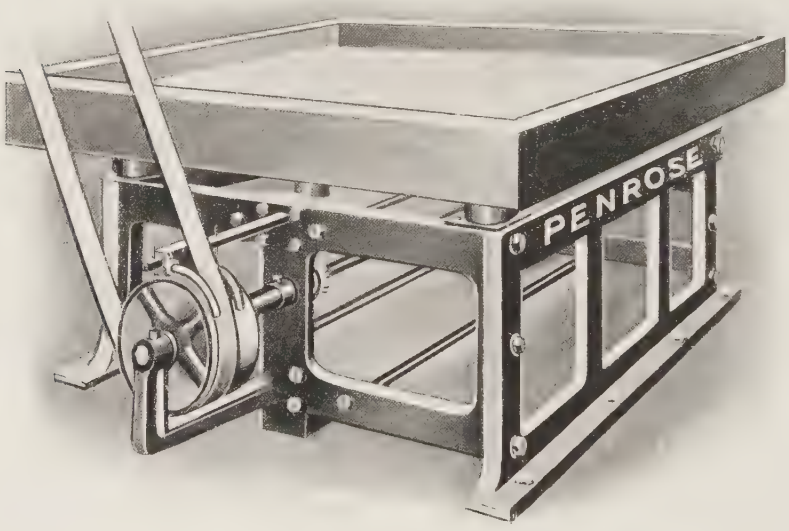


Fig. 1.

The concerted combination and unison of these assailing forces upon lithography have moreover overcome most of that old *insular* and conservative prejudice against new methods which for so long characterized the older adepts of the lithographic craft ; so that there has latterly been less resistance from within, whilst greater progress came from without.

Now as to the actual conquest of zinc itself, and the many interesting developments which piloted it to its present principal position, as the premier metallic printing surface in lithography ; and, moreover, enabled it to not only rival the lithographic stone itself, but in many instances to even surpass it in the results procurable from it, are really most striking examples of "planographic printing evolution."

In the first place, the mechanical appliance known as the plate graining Machine (fig. 1) has solved the primary difficulty hitherto encountered of pro-

ducing a uniform "water-retaining-reservoir-surface" on the plain inkless areas of the plate surface.

Now by means of this machine, a regular, perfect granulation of the plate surface is produced in as many minutes as it would have taken hours before, under the old hand-graining methods. Thus a reserve of moisture can now be maintained on the plate that was deemed impossible under the older incompetent hand methods, now virtually entirely discarded.

Not only is a large plate surface efficiently roughened, which is so essential a condition of the process, but this process can be carried out in much less time than would be occupied in repreparing a stone of corresponding size, and with less labour cost into the bargain. Thus this initial difficulty of "metalithography" is now overcome.

But to return to the all-dominating factor of metalithography, that of the "etching" process. Here in the lithographic processes, the actual printing surface is all on one "*common plane*," unlike the "*relief*" block process, in which the "lights" of the design or illustration occupy a lower plane: one much below the actual printing image surface proper.

The old defects of metal plate printing in lithography have been the gradual degradation of these "image lights" during printing, under old conditions of etching.

In short, the old types of etching solutions were of a fierce "corrosive" order, tending to not only eat away a slight surface portion of the exposed parts of the plate, but also to undercut the finer "hair lines" and "stipple" when a strong etching solution was employed.

Then again the result of the etching was unstable, as only a loosely attached and soluble deposit was formed by it on those plain areas of the plate: the complete loss of this deposit soon occurring during printing operations, and then the trouble of degradation of the print at once set in, with the consequent concomitant of imperfect work.

Now in the perfected method, non-corrosive "etching solutions" are employed; ones which produce an *insoluble layer* with the *plain uninsulated parts* of the plate surface, rendering those parts not only impervious to grease, but also entirely overcoming that formidable old time trouble of "oxidation," which has hitherto been always a bugbear of metalithographic processes.

To summarize the advantages now enjoyed by the lithographic trade through the up-to-date developments of zinco-litho methods: we are not exaggerating when we aver that more than *double the volume of work* can now be done than heretofore: and that in many classes of production done in a *more perfect manner* than is possible from the litho stone. *Sharper* and clearer images and *longer* runs can now be accomplished from zinc than what was hitherto attainable from stone, whilst its attainments in such photo-colour processes as the "Frey" eclipse any other known method. Besides this the work is done in a more *economical* manner; and what is still more to the point, accomplished with greater *expedition* and *higher efficiency* than any other competing rival process.

The outcome of all this is, that the present-day attainments are now forcibly verifying what a few of us dared to predict many years ago, that the future triumphs of lithography were bound up in the alliance of the camera with metalithographic methods, which would ensure its continued pre-eminence as the most perfect and artistic of the reproductive processes of the age.

My Experiences with the Omnicolor Plate.

By Prof. E. VALENTA, Vienna.

(Translated by E. D. Cyfer.)

AT VOLENDAM.

ASHWORTH & MEREDITH. Photo by W. GAMBLE.

THE Omnicolor plate of the firm of J. Jougla, of Paris, is the second colour-screen plate which appears on the market, and is destined to compete with the autochrome plate. About this plate much had already been written before it made its appearance, so that it was looked forward to with much interest and perhaps too great expectations. As regards the properties and treatment of these plates, sufficient has been written by Baron Hübl, Scheffer, and others, in trade periodicals, and I wish to limit myself, therefore, especially to recording my personal observations whilst working with these plates, and the results of my investigations concerning the colour-screen of the emulsion layer.

The treatment of the Omnicolor plate is easier than that originally prescribed by Lumière Bros. for Autochrome plates. It consists of exposure behind a rather light yellow filter, developing with metol-hydroquinone developer, reversing the image with a solution of bichromate containing sulphuric acid, blackening of the remaining bromide of silver with the same developer, fixing, washing, etc.*

The sensitive film, as well as the colour screen, is not so easily damaged as the Autochrome film. My endeavours to separate by means of hot water the gelatine film of an under-exposed developed plate from the filter film, met with great difficulty, in consequence of the use of the chromate solution for the treatment of the image. I had, therefore, in order to investigate the colour screen more closely, to treat an unexposed plate with hot water. Thereby the water was coloured red, the emulsion layer was dissolved, and the solution showed a green fluorescence, which indicates the presence of a colouring matter of the eosine series.

The screen, thus freed from the emulsion, consists of red, green and blue filter elements. Observed with the naked eye the screen showed a reddish colour, with other plates a more bluish one, and diffraction effects were noticeable. The ruling of the screen shows, when examined under the microscope, dark blue lines, between which red and green filter elements at right angles are placed in such a way, that the single elements touch each other without any division, being separated by yellow edges. The surface of the red and green fields is $0{\cdot}05 \times 0{\cdot}06$ and $0{\cdot}06 \times 0{\cdot}07$. The blue stripes are narrower, about 0·04 to 0·045 mm.

* Compare also W. Scheffer, "Photographische Rundschau," 1909.

According to the French patent No. 387,828, which was granted to Messrs J. Jougla, Ducos du Hauron and R. Bercegol, the colour screen is made in such a way that a glass plate is covered with a celluloid (or collodion) film, and upon this are put down in different colourings two systems of ruling, which cross each other, after which the plate is treated with the solution of the third colouring matter in a proper solution (for celluloid, acetone or amyl acetate), which permeates the film layer and is without influence upon the ruling systems, which cross each other at right angles.

Treating the colour screen with boiling water, the latter is coloured red and fluoresces a yellow green. Examined under the microscope nearly the same image is seen as before, only the red filter elements have become lighter. If the screen is treated, however, with acetone, the yellow and red colouring matter is dissolved with the film, and under the microscope is seen an image which shows two crossed systems of ruling, of which one consists of broad clear blue lines and one of narrow dark blue ones, whilst in the place of the red filter elements, are uncoloured surfaces. The green consequently consists of yellow and blue, the red of purple-red and yellow.

As a result of these trials the supposition appears to me justified, that in making the screens the following procedure was adopted. A glass plate, coated with celluloid varnish is ruled by means of a blue varnish paint with a system of parallel dark blue lines; further the varnish layer left exposed between the lines is coloured yellow and a second system of parallel blue lines is drawn at right angles to the first ones, with a clear blue varnish, after which the parts which remain free from varnish are coloured red with a solution of colouring matter.

Soda lye of 40° Beaumé destroys the blue colouring matter of the green parts, whilst the dark blue colouring matter of the lines is thereby made a violet brown.

The colouring matter of the dark blue lines is further destroyed by ammonia, but re-appears after treatment with diluted acetic acid, whereas the blue colouring matter of the green parts is not affected. After treatment with hot alcohol, the red and yellow colour can be removed and there remains in the green parts and blue spaces a system of parallel running lines. The alcoholic solution is coloured red, and fluoresces yellow-green, the red colouring matter being precipitated by compounds of lead. It may be a dye of the eosine series which, of course, does not tend to make the picture very resistant to the fading action of light.

As is shown by an experiment the red dye as well as the yellow changes, indeed, under the influence of sunlight, and the colour screen becomes a bluish shade.

The investigation of the filter elements as regards their transmission to light of the different spectral regions was made by means of a Zeiss Microspectroscope and showed for the red filter elements a transmission of $\lambda = 590\mu\mu$ against the less refrangible end, for the green ones of $\lambda = 480$—590, and for the blue ones of $\lambda = 480$ against the more refrangible end of the spectrum. The zones of transmission of the colours of the Omnicolor plate lie, therefore, without overlapping close to each other, and the separation is a sharper one than with the Autochrome plate. The yellow filter employed for the taking is much clearer than the filter of Lumière for Autochrome plates; similarly the transparency to light of the colour screen is also greater than with the Autochrome plate; notwithstanding this the Omnicolor plate requires an exposure nearly three times as long as the Autochrome plate, in order to obtain a fully exposed and detailed negative. The reason of this relatively low sensitiveness can therefore only be found in the light-sensitive film (silver bromide gelatine emulsion) of the Omnicolor plates.

The light-sensitive film of these plates gave, directly illuminated in the spectrograph, then developed and fixed, a sensitizing band reaching from B ½ C to E ⅔ F which was separated by a clear minimum from the sensitiveness of the silver bromide emulsion. In the sensitizing band two maxima, lying near the Fraunhofer lines C and E could be distinguished. Probably a mixture of colouring matters of the cyanin group may have been used for the sensitizing of the emulsion, and the colour sensitiveness must be considered a very good one.

As regards the sensitiveness of the silver bromide film, this was determined with different emulsion numbers, for comparison with that of the Autochrome plates. To this end an Autochrome and an Omnicolor plate were put at the same time in an Eder tube photometer with an ordinary dry plate of which the sensitiveness was known, exposed to the daylight reflected from a white screen, and recorded in this way. The emulsion of the Autochrome plate on the average is three times as sensitive as the Omnicolor plate, which explains the long time of exposure necessary when using the latter plates. As was shown by the experiments made by me and Prof. Kessler in the studios of the K. K. Graphischen Lehr-und Versuchsanstalt, the Omnicolor plate gives, when rightly treated, satisfactory results as far as rendering of colours is considered, only the rendering of grey leaves much to be desired. The making of portraits in the studio was not successful, on account of the low sensitiveness of these plates.

The Omnicolor plate at present on the market is a very useful colour screen plate for colour photography, but not a complete substitute for the Lumière Autochrome plate, and is not likely, now that the price of the latter has been reduced and easier instructions for use have been issued, to enter into considerable competition with the Autochrome plate.

On the Fal, Cornwall.

Glasgow Photo Engraving Co.

Photograph by M. R. Tozer.

A Costly Cheapness in Electros.

By FRANK COLEBROOK.

An Old Door, Bruges.

Photo by
Hill & Co. Godfrey Bingley.

A FEW words on a subject on which many words would be inadvisable, the general weakening in the prices for electros—of a sort. It is a subject on which there may most easily be the gravest misunderstandings and misjudgments. Peculiarly it is a subject on which long views and wide views are incumbent; for the weakening has the look of a boon to the printer, whereas it is, in fact, pregnant with great injury to those disposed to welcome it.

It removes from the region of demonstrable, concrete things, the one and only encouragement to engravers of original plates to meet or confer and to exact by mutual understanding, a slightly higher standard of reward. The slight enhancement of the electrotyping scale, being the result of conference, was an object lesson rebuking the *non possumus* class of engraver. It was a definite though small success, which, with two or three years' duration, was sufficiently protracted to speak with some title to a hearing its message of hope. "A very great loss is the loss of hope," old Dr. Johnson once sadly reflected; and the word is true for our and for all times.

The set back—the temporary set back—in this especial particular must tend to inferior electro work. And three-colour plates were already quite sufficiently prejudiced by bad electrotyping. The precise extent of the hindrance no one can express, for the reason that no one knows how often a mental debate, "Shall I do this job by three-colour?" has been decided by a "No," owing to the too general bad repute of electros from three-colour. We have seen a good many instances in which the practice of electrotyping from half-tones has been abandoned in favour of the practice of stereotyping from them. There must have been many cases in which the whole consideration whether to print at all has petered out in nothingness. When men are not thoroughly sure of the dependableness of duplicate plates they are apt to "promise, pause, prepare, postpone, and end by letting things alone."

And this unsatisfactory duplicating is all so needless. Electrolysis is a process of nature, and nature is faithful. All science, for that matter, and most if not all industrial processes would be arrested, if nature once played us a trick.

Why then are the ultimate results of the process, as they come to the hand of the printer, so variable? The answer is that the personal equation comes into the handling. There are eight or nine manual or mechanical processes to go through, first to last. These, for their perfection, require plant which is every year becoming increasingly costly; plant which includes the most modern,

powerful, searching method of moulding, the most subtle and effective routing, and the truest planing, by vertical or horizontal instrument. It costs a great deal nowadays to properly equip an electrotyping foundry, certainly if the work is to be expeditious as well as of good quality, and there is commonly no good reason why it should not be both. Let electro-plate prices be unduly depressed, and what follows ? To maintain the same turnover, the plant must be worked harder and its bearings and delicate adjustments must tend more and more to get out of gear. This is soon fatal to the best work. In other words it is soon fatal to economical press work in the machine room of the customer. It is soon injurious, too, to the reputation of the maker of original plates, for he is sure to be accused, sooner or later, of having sent in plates so badly etched as to be impracticable for duplicating. The remedy for all this is obviously the equipment of the foundry with fresh plant. And the lowered scale of receipts may well tend to make that impossible. It is a vicious circle.

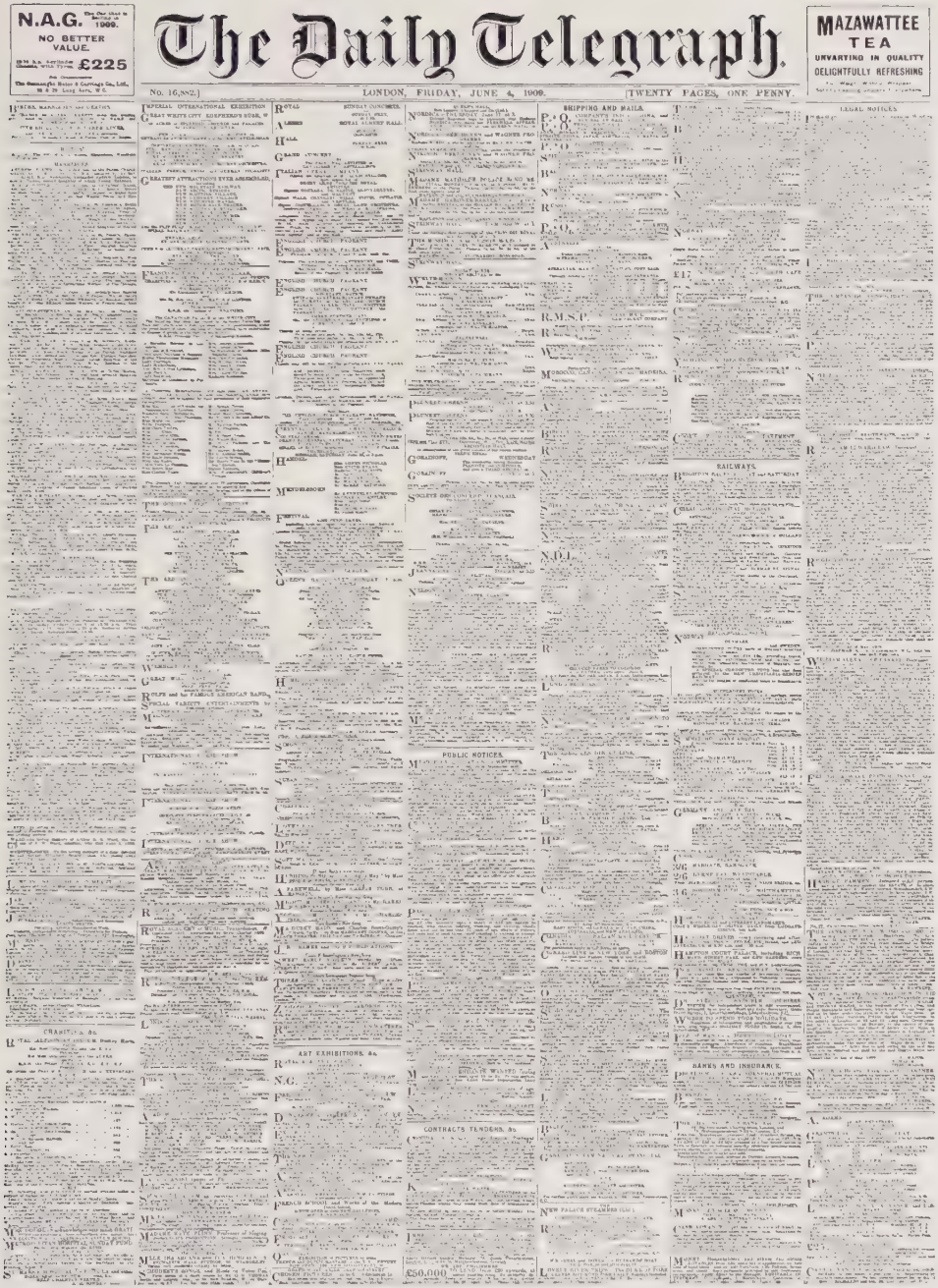
The past makes only too plain that this is no fancy picture. It is quite melancholy to reflect upon the disappearances of electrotyping houses in the Metropolis alone, within recent years.

Where is the large house which sent forth so many duplicate plates from Doctors Commons ? Where is the one, which, almost forty years ago, was strengthening its connection through the interest created by Leitch's process, and which, as an electro house, endured for several decades ? Where are the plate-makers whom Great New Street saw at work through thirty years ? Where is the house which again for thirty years had a supposed impregnable position in the west of London ? These were no mushrooms ; albeit that some by whom the list of deceased firms might be extended had a shorter life.

These recollections should give pause to those who see in a seemingly chastened duplicate plate-maker of the moment one who may be driven from concession to concession. The cute adroitness which would seize and profit by this opportunity is after all nothing but the cuteness satirised in the Proverbs, of those who " lay wait for their own blood, and lurk privily for their own lives." Just as a high death-rate necessarily argues a low health rate among the living, and really would be better so expressed, so the very exceptional death-rate among Metropolitan duplicate plate-making firms, in the last decade or two, witnesses to the more or less inefficient, not to say, distressed conditions, under which some surviving firms must have worked.

The ultimate employer of us all is the British public. Why not get that fact burnt into our consciousness ? We may be master engravers or master printers, or master this or master that. It is largely self-deception. We are not masters at all. We are servants, whatever airs of independence we may put on. If we are to get more money from our employer, the British public, we must take a leaf out of the book of those who have shown how concessions have been obtained from their employers.

There would be plenty of room for the play of different qualities and powers and services by different plate-makers (duplicate or original), even if there were an underlying agreement on one or two basic propositions—as, for instance, that one might as well play for nothing as work for nothing, and that two and two made four and not three and three quarters. Something in the direction of solidarity is feasible here and now ; and by recognising and applying what is possible, a somewhat better standard of living—for that is what it comes to—a somewhat better standard of reward can be secured. To concerted action it behoves the maker of plates (duplicate or original) to turn his eyes, and direct his mind, his strength and all that is within him.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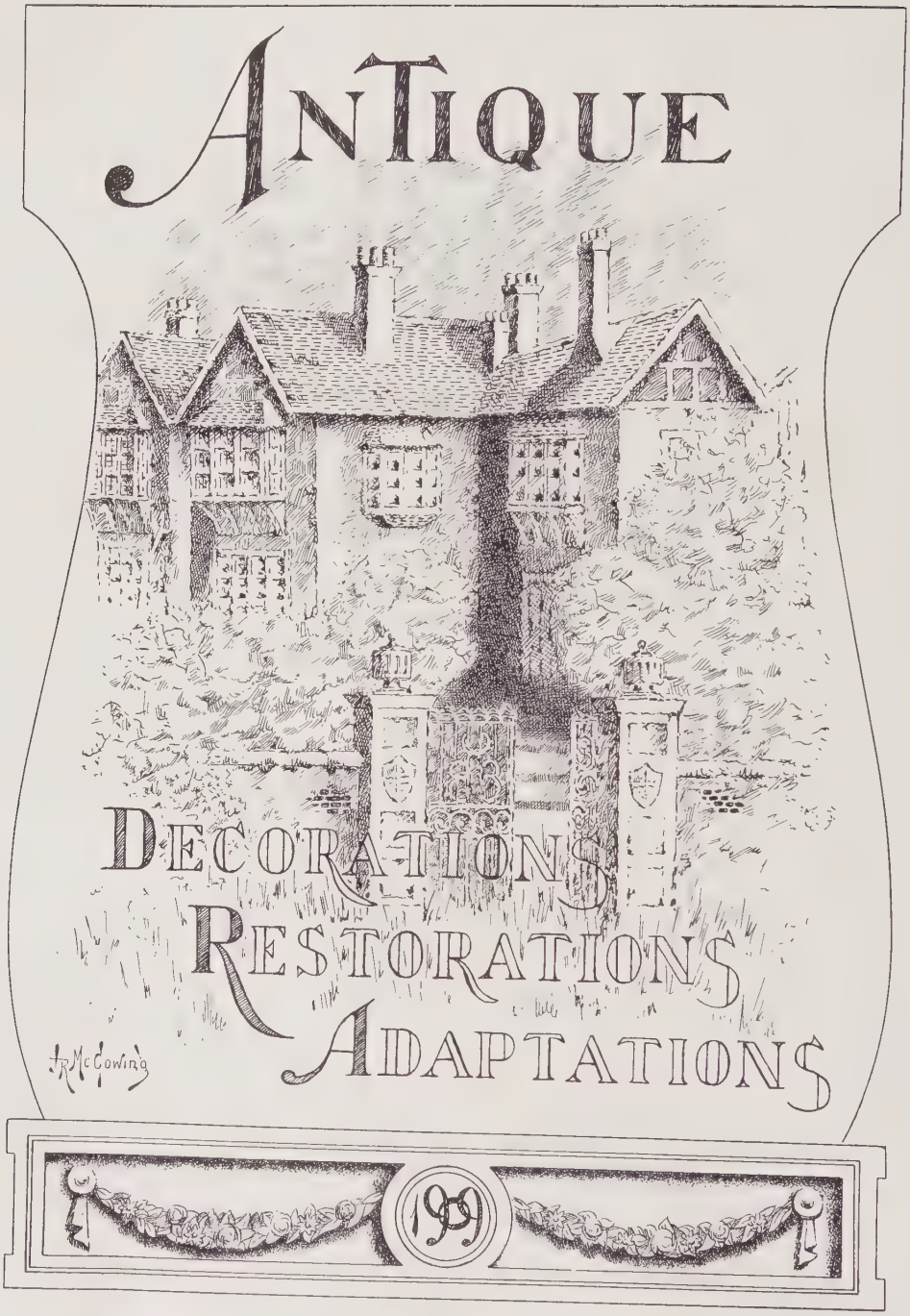

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Sketch by J.R. McGowing.

A Pen and Ink Booklet Cover.

(Etched on the Levy Acid Blast Machine).

Blatchford Bros. *From a Pen and Ink Drawing by J. T. Garside.*

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The Wolf.

THREE-COLOUR PRINT FROM PINACHROME SENSITIZED NEGATIVES OBTAINED BY PROFESSOR R. NAMIAS.
(See Article)

FOUR-COLOUR PRINT FROM NEGATIVES SENSITIZED WITH ETHYL VIOLET AND ERYTHROSINE OBTAINED BY PROFESSOR R. NAMIAS.
(See Article).

Inks by Shackell Edwards & Co

The Panchromatizing of Dry Plates.

By Professor RODOLFO NAMIAS, Milan.

(*Translated by E. D. Cyfer.*)

A CHILD STUDY.

Block by ASHWORTH & MEREDITH. Photograph by GREGG, COUPER & Co

THE colour senzitising of gelatine silver bromide plates is a practice which is not followed by the photo-engravers to the extent it deserves.

As a rule they are satisfied with the less complete results in the trichrome selection furnished by commercial panchromatic plates. At present there are, it is true, on the market panchromatic plates of a rather good quality, but even with the best kinds I have never been able to obtain in the trichrome selection such good results as by employing plates I have sensitized myself.

Further, one is never sure that the panchromatic plates of the trade are of recent manufacture and not fogged, whilst the price is generally higher than that of plates sensitized by oneself.

Very often one imagines that the sensitizing of plates by bathing offers rather considerable difficulties. It is above all the rapid drying which one finds a difficulty in without a special drying arrangement with electric ventilator as advised by Prof. Miethe. But I have been trying to eliminate this difficulty without jeopardizing the efficacy of the sensitizing.

A few years back Dr. Valenta advised the use of senzitising baths containing up to 40 per cent. of ethylic alcohol, or still better, 50 per cent. acetone. He discovered that these baths are well suited for those most important sensitizers, ethyl red, orthochrome, pinachrome and pinacyanol.

By sensitizing plates under these conditions the arrangement for quick drying could be dispensed with.

I have tried this method in comparison with the usual one, but I am able to state that it is difficult to obtain through this method of Valenta's an equally satisfactory sensitizing as with the other.

This one notices especially in the practical use of plates for the trichrome selection. It is necessary to expose longer in order to obtain the same results. I believe that the permeability of the film, which may be different on one plate from that on another, has a considerable influence upon the intensity of the sensitizing.

I have sought to avoid the use of baths containing spirit or acetone without being forced to have recourse to complicated arrangements for drying. Above all I have tried whether the use of a tightly closed box, in which an iron pan has been

placed, containing a rather large quantity of dry chloride of calcium (2 to 7 lbs., according to the size of the case) would be suitable. But after numerous trials under different conditions, I am convinced that with the more energetic sensitizers (pinachrome and pinacyanol) it is difficult to obtain plates without spots after the blackening, and this notwithstanding a washing of half-an-hour after the sensitizing.

One is not able to give a sufficient reason for this, though it may be thought that the too violent drying action which is produced by absolutely dry air on the surface of the plate makes the surface less permeable, and it is possible that in the interior of the film there may remain spots where the moisture finds a difficulty in escaping. This does not occur with the much more gradual drying process which is caused by a current of air in the drying arrangement indicated by Prof. Miethe. I will at once add that the drying by chloride of calcium is very well adapted without anything else for drying plates made sensitive with ethyl violet and erythrosine, of which I will write further on.

In order to devise a drying process which will work under very favourable conditions without having recourse to the use of arrangements of little practical value for small installations, I have sought to combine a first drying by means of spirit with drying by chloride of calcium. By this process I have always obtained absolutely perfect results. Here is my way of doing it.

The extra rapid plates of good quality are placed, in absolute darkness, in the sensitizing bath. It is said that generally it is sufficient to leave them there two or three minutes. But acting in the way which I am going to indicate, I have found that this time is too short. I therefore leave the plates at least fifteen minutes in the bath, and it is not necessary to watch it. Thus one is sure, with whatever plate is employed, and with even a slightly permeable film, to obtain a complete sensitizing throughout the thickness of the gelatine coating. The plate, after this treatment, is put in a large trough containing water, or, better still, is rinsed for a few moments under a water tap. Further, the plates are put in a dish containing alcohol of 95°. After one minute they are taken out and are put in the box containing the chloride of calcium. In two or three hours the plates are perfectly dry and ready for use. The alcohol can be used several times and from time to time it can be changed or made stronger by adding alcohol of 95°. It becomes strongly coloured, but this does not result from the fact that it dissolves a large quantity of colouring matter, but from the propensity of dyes derived from isocyanine to colour alcohol much more intensely than water.

I will give the recipes which I prefer for panchromatizing plates :—

Violet of ethyl (Badische Anilin Fabrik)	1,00 gm.
Erythrosine	0·50 ,,
Pure alcohol, 95°	500 c.c.
Distilled water	500 ,,

For use 2 c.c. of this bath is taken with 0·5 c.c. of ammonia and 100 c.c. of distilled water.

This bath is a slight modification of the one indicated by Dr. Valenta a few years ago. Valenta also added eosine, but I have found that this has no advantage. I have also tried the use of erythrosine and ethyl violet as well as other colouring matters of the series of eosines (Rose Bengal), but without any advantage.

For sensitizing with pinachrome the recipe to be employed is the usual one, *viz.* :—

Pinachrome	1 gm.
Pure alcohol of 95°	500 c.c.
Distilled water	500 ,,

For use 2 c.c. of this bath is taken and 100 c.c. distilled water. This 100 c.c. bath serves for two plates 13 by 18. The addition of 0·5 c.c. ammonia to 100 c.c. of the final bath is useful, but not quite necessary. Without modifying the character of the sensitizing, the addition of ammonia increases to some slight extent the effect of the sensitizing bath. But the keeping qualities of plates sensitized with pinachrome with the addition of ammonia is doubtless rather diminished, and the tendency to fog, especially if the drying process has not been carried out under the best of conditions, is a little greater. For that reason I prefer to use the pinachrome bath without ammonia.

And now let us see the comparative properties of the plates sensitized with the respective baths.

The first bath is very economical ; as I have said it does not require the same attention to drying as that of pinachrome. And also, as concerns the preparation and manipulation of the plates it requires much fewer precautions. But the intensity of the sensitizing is far less than that obtained by pinachrome.

If one compares the two spectral bands obtained by the prism, one finds that the plate sensitized by means of pinachrome gives a band which runs from ultra violet to nearly all the red, with two inconsiderable minimas, one between G and F (blue green) and the other between D and E (yellow green). On the contrary, plates made sensitive by means of ethyl violet and erythrosine give a spectral band which goes only very little higher than the D line (yellow), with a rather pronounced minima between G and F (blue green).

In a parallel case of exposure the part between F (green) and orange is much less intense with the ethyl violet and erythrosine than with pinachrome. And it is necessary to add that the pinachrome acts in a considerably more forceful way, in reducing the action of the blue and violet.

If the spectral bands obtained with plates sensitized by the two sensitizers indicated through the filters which are used in the trichrome process are compared, a clear difference is seen in the bands obtained with the orange filter, a less considerable difference in the bands obtained with the green filter. Through the orange filter a much less intense band is obtained on the plate sensitized by ethyl violet, and it is less extended as well, increasing the exposure to double.

The difference in the spectral bands of plates sensitized with ethyl violet and erythrosine in comparison with those sensitized with pinachrome, shows at once how also in the practice of three-colour photography the results must be different.

Indeed, one must expose, for the plates treated with ethyl violet and erythrosine, through the red filter, for at least double the time for a plate treated with pinachrome ; and notwithstanding that the rendering of the yellow, red and orange in the negatives is never so perfect as with the pinachrome plates. I give with this article examples of trichrome reproduction, obtained with plates I have sensitized, and with a light filter also made by myself, keeping to about the colours of the filters of Prof. Miethe. In these filters I have only modified the colour of the green filter, as that of Miethe is too yellow, and especially with plates of considerable sensitiveness to red, as are the pinachrome plates. The red negative is insufficiently covered in the blue and blue-green, and through this there is an invasion of red in the blue and blue-green, which rather falsifies the results.

The proofs of flowers which I give have been taken from nature. It will be seen that the proof obtained with the pinachrome plate has a greater vivacity and exactness ; this proof is nearly perfect, although the retouching has not played any special part. One can also see the excellence of the reproduction

by examining the small colour chart of Hübl which I have photographed with the subject.

The prints obtained with plates made sensitive by means of ethyl violet and erythrosine are certainly not bad, but especially the yellow and the red ones are inferior to those obtained with pinachrome plates. And this is not surprising after what I have said about the characters of the sensitizing by means of ethyl violet and erythrosine. The action of the red, orange, and yellow parts of the subject is not so intense and complete as on the pinachrome plate. The negative of the blue is not sufficiently covered, and that produces an impression of blue in the yellow, orange and red, which must evidently suffer more or less.

And now, in conclusion, I would say the sensitizing of plates oneself by the method indicated proves to be easy and certain. This method of sensitizing has the great advantage of placing at the disposal of the trichrome operator a fresh sensitizing material of constant quality. In addition he will be enabled, much better than with the panchromatic plates of the trade, to effect the necessary harmony between the colour of the filters he is using and the character of the sensitizing.

TAIL PIECE

Design and Block made by
STUDENTS OF L.C.C. SCHOOL OF PHOTO-ENGRAVING.

C. Angerer & Goschl

On the Lake of Garda.

From a painting by

A Practical Process of Three-Colour Etching.

By ALFREDO MANGIAGALLI, Milan.

(Translated by R. Born.)

POSING PUSSY.

Design and Block by E. HAMEL & Co.

Photograph by FRECKLETON & Co.

THE three-colour process is in theory mechanical work, but in practice it is mostly artistic work.

A rather perfect degree of mechanical selection has been arrived at, but still to-day and in future the good result of a trichrome depends, and will depend, upon the artistic capacity of the workman, who etches the block with acid and finishes it with the gravers.

A good operator can do a great deal to reduce the eventual selection-work of the etcher, but however perfect his negatives may be, if the etcher has not got the right idea of the colours and the drawing, the work will never be perfect.

Let us lay down as a principle, that three-colour work, differently from the other photo-mechanical processes, depends for its fine results more upon the arts than the mechanics, according to my opinion the following necessity arises, that is, that the etching and the retouching by means of the gravers must be done by one workman only, so that there is only one artistic personality in the work.

In the majority of the important Italian and many other foreign establishments it is the custom to distribute the three-colour work amongst various workmen. This hinders, according to my opinion, the quick production of the work itself and diminishes the quality of the product, however good it may be. By this method, by which one man only does a part of the work, it is impossible for him to have a clear idea of what he does, or has to do. It is therefore advisable to concentrate the work of etching and retouching upon one man only.

I also believe that for those who work with the brush on the plate, it is best to print the negatives by the ordinary enamel process, preferably a cold one, provided that the enamel is not soluble in benzine, turpentine, alcohol, etc.

The enamel print, especially the hot enamel, always tends to give a certain sharpness to the etchings because of the disproportion which is often found between the black and white tones and which is caused through foggy parts in the dark half-tones, upon which the action of the acid has less effect than upon the white parts. This increases the contrasts, which, repeated in the three colours, give in the middle tones this lack of colour rendering, which one tries so much to fill out.

It is better to make a strong print than a weak one. It is well to check again the measurements for registering, which can easily be altered on the exposed plates. The plate is now etched for one minute in 25 parts of nitric acid to 1,000 parts water, and under slight rubbing with cotton wool. Of course, before etching one has to cover (or protect) those parts which appear entirely black on the original.

In most of the cases it is best to etch the zinc plate in a nitric acid bath of 50 parts to 1,000 of water. A weak acid bath which bites slowly also appears to have little effect on the covering, but the more it is repeated the more it reduces the uncovered parts, and it becomes necessary to wash the plate without having obtained the desired results. The 50/1,000 acid also serves beautifully if there is any fog on the plate.

For etchings on copper or brass I use perchloride of iron from 37-40 degrees, and for the foggy parts in the half-tones I use the following formula :—

Water	500 c.c.
Bichromate of ammonia	100 grm.
Sulphuric acid, pure ..	50 c.c.

After well rinsing and drying the plate, roll it up with soft etching ink, powder it with finely powdered bitumen and burn it in. Etch again in the same acid for five minutes when using a 150 line screen, and a few minutes more or less, when using a coarser or finer screen. There is no rubbing with cotton wool required this time. After having treated the red and blue plates in the same way, a proof is pulled in order to see whether there are mechanical defects and to get a general idea of the state of the various sections.

The Cookhouse.

The Premier Engraving Co. Photograph by J. P. Glover.

Remove the grease from the plates by means of benzine or alcohol and start working with the brush. Start with the yellow printing plate. Amongst the various methods of covering, I find it the most practical to work with bitumen dissolved in turpentine, because when working with this, magnesia can be put on the plate, which enables the workman to see better what he has to do, because now he enters into a purely artistic phase. You thus proceed from the yellow to the red printing plate. In covering with the brush start from the black or dark half-tones of the vignette, and then reduce the covering in the high-lights. It is not a practical way to cut out the high-lights right from the start when etching the plate, because contrasts are thus created to the eye of the etcher which ought not to be.

I prepare the plates up to a certain point and then take a proof from the yellow and red plate. The blue plate is etched in the same way as the others, and then a complete proof is pulled in order to see the result of the work done up to now. At this point, the colour rendering of the trichrome ought to be very near to the one of the original.

Study well the corrections required by each plate and start work again,

commencing with the yellow plate and then proceeding with red and blue. If you are convinced that no more cutting out by means of the acid is required, wash off the enamel with soda and proceed with retouching by means of the etching tools.

The tool-retouching ought to be limited to the mechanical part of the work only, such as lightening up grounds and cutting screen imperfections, etc. The mechanical retouching must not interfere with the artistic part, if it can be helped. Increase tints with the burnisher and clear up outlines.

If one is convinced that the colour sections give the nearest possible result to the original, the final proofs can be pulled by using stiff ink—from the same maker and series—by taking care that sufficient time is left for the red plate to thoroughly dry. The work, if it has been well selected, ought to be finished with this third proof.

Should a further correction be necessary proceed in the same way as before. In working up the blue plate it is advisable to use a red glass plate, which gives a perfect selection and thus enables the etcher to proceed much better with the work.

It is, perhaps, useless to say that this three-colour etching process is for reproduction by emulsion or gelatine direct from the original.

The above process is one of the most simple and practical for three-colour work, and if it is worked by skilled artists it yields quick and good results.

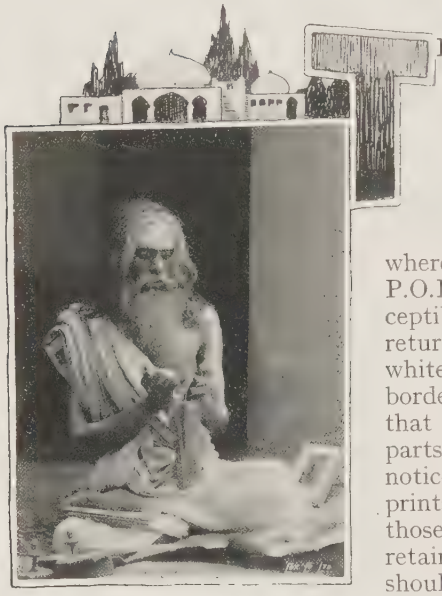
TAMIL MUSICIANS.

Photograph by
S. K. LAWTON.

WESTERN MAIL LTD.

Gelatine Paper Troubles in the Tropics.

By S. K. LAWTON, Jaffna, Ceylon.



A Tamil Physician.

The Arthur Cox Illustrating Co., Ltd. Photograph by S. K. Lawton.

THOUGH I have been using papers with gelatine as the vehicle for the sensitive ingredients ever since their introduction, and have had hardly any cause to find fault with them so long as their use was confined to the dry northern parts of the Island of Ceylon, about four years ago a branch was opened in Colombo, where the atmosphere was generally humid, and P.O.P. prints a few months old showed a perceptible fading. Some bromide prints were returned after a few weeks with irregular, white, well-defined streaks running from the borders. On close examination, it appeared that the gelatine was scraped away from those parts. While looking about for a cause I noticed the trimmed out margins of P.O.P. prints, lying on the floor, sticking to the feet of those walking over them. These trimmings retained a good amount of moisture, which should have caused some action on the reduced silver composing the pictures and the resultant fading. In the case of the bromide prints the damp atmosphere had made the gelatine succulent and attracted the attack of insects in search of food. Thoroughly hardening the prints in a bath of chrome alum, one grain to the ounce of water, rendered them impervious to moisture and prevented the consequent liability to fading, as also to some extent the insect attacks. A weak solution of arsenic was applied to a bromide print, which, after keeping in light and air for about two months, did not show any deterioration. This will ward away insects, but cannot be relied upon, as it should exert some action on the silver compound. The preservative selected should be of vegetable origin, non-volatile and colourless. In searching for it, I encountered a native Tamil physician who can well be called a "voluminous writer," for he had copied down on a palm-leaf book the ten thousand verses comprising a Hindu religious work, in fulfilment of a vow. Such books have been in good preservation for centuries uninjured by insects. To my enquiry the physician gave me the recipe for an ink prepared from local herbs and roots, which, rubbed into and wiped from the leaves, filled in the writing done by scraping with the pointed iron stylus. The special ingredient used to ward off insects was a decoction of the root of the aquatic plant Sweet Flag, in Tamil called *Vasambu*. This, applied to bromide and P.O.P. prints, will not have any deleterious effect on silver compounds and should keep away insects.

Entwistle, Thorpe & Co.

Negative on "Graphic" Process Plate.

A Study.

Wrinkles on Redcol.

By G. C. LAWS.

Block by Ashworth & Meredith. Photograph by Gregg, Couper & Co.

COLD enamel is a process which cannot fail to be of interest to those using zinc for newspaper half-tones, or to the photo-lithographer working direct on to either aluminium or zinc. As one who has had a very considerable experience in the use of this process I felt that it would be helpful to my fellow-craftsmen to put on record the wrinkles I have learned in working. In using this process the first point to master is the preliminary coating with the red solution; here the essential requirements are, first, that the plate must not be too hot; about 100° F. is sufficient, thus avoiding any tendency to dry in streaks, which will often occur if the plate is too hot, or again the red coating will crack in a network all over the plate from the same cause. The coated plate is better if allowed to stand for half an hour before putting on the bichromated fish glue, and as the plates will keep indefinitely a number should be prepared and stored for use when required.

After use and the necessary filtering the solution will thicken by evaporation of the solvent, and should be thinned by adding some industrial alcohol. It is better also to thin it for coating large plates, as this makes the operation much easier. The best method of coating is to pour a pool of the solution on the middle of the plate, and allow it to spread from side to side, while held in a horizontal position, till the plate is quite covered; then turn the plate face down and whirl quickly, as an extremely thin coating will resist perfectly the action of an etching bath containing 20 per cent. of nitric acid.

The next point of importance is to avoid a thick fish glue coating for the sensitive film, and the following formula will be found very satisfactory:—

Le Page fish glue	3 ozs.
Ammonium bichromate	120 grains.
Water	9 ozs.

Ammonia ·880 till just lemon yellow.

This again must not be made hot when drying or cracking will result. The printing does not call for much comment except that a negative that will allow of a good printing will give the best resist for the spirit development; but good results can be made from negatives too weak to give a satisfactory enamel print, because so long as it is possible to get the glue image to stop on the plate, the Redcol underneath is as good as reg rds acid-resisting power as one made from a perfect negative.

After printing wash out and dye as usual with methyl violet, and dry thoroughly before the spirit development; this is preferably done by immersing the plate in a bath of No. 3 Solution as supplied by Messrs. Penrose & Co. Brush the plate lightly with a broad camel-hair brush to remove the Redcol not covered by the fish glue image, it should not take longer than twenty seconds to go over the plate, then it should be placed under the tap allowing the water to run from one end to the other so as to take off the Redcol-laden spirit in an even wave, a light rubbing with cotton wool will remove the last traces of the dissolved Redcol, leaving the work still covered with a perfect fish glue image, which may be dried, and the whole operation of developing in No. 3 Solution may be repeated if it is found necessary to compensate for any errors in manipulation during the first development, but if this is carried out as described above the second development will never be necessary. The fish glue image is now rubbed off with a tuft of cotton wool and the plate is ready for etching with its temper unspoiled by any burning whatever.

Redcol in Photo-Lithography.

Valuable as this method is in photo-engraving, in photo-lithography on metal plates it promises to be still more valuable. The wrinkles I have gained in its use for this latter purpose are as follows :—The operations of coating, printing, etc., with small sizes are as described above, with the exception that where a coarse grained plate is used the red coating should be thicker, so as to bury in the points of the grain, but as such plates are not very suitable for photo-litho they should not be used.

Block's litho zinc plates have a perfect surface for coating with redcol and are very satisfactory. For large sized plates above 15 by 12 the whirler method for coating becomes difficult; also in the thinner gauges of metal the comparatively rapid cooling makes the redcol dry matt instead of glossy. I have overcome this difficulty by taking another sheet of metal slightly larger than the one to be coated; this should be 16 B.W.G. The thin plate is placed on the top, and both are warmed up together and the redcol is coated by pouring on one corner, flowing all over the plate and pouring off at one corner in the same way as coating a plate with collodion, keeping the plate nearly level so as to get the coating even. The fish glue may be applied in the same way, printing, developing, and dyeing the image are exactly as described above, also the No. 3 development, except that it is essential that the whole of the Redcol not forming the image must be removed, and as the grain of the plate holds the redcol very tenaciously a second development in the No. 3 Solution may often be required; when the plate is quite clean rub off the fish glue image and gum up with clean gum, dry and roll up in the usual manner, or it may be etched at once with the usual litho zinc etching solution and then rolled up. It will take the ink readily and be found to work exactly as the lithographic ink image. It does not depend for its holding properties on the slight stain of grease on the plate as is usual in lithography, but on tenaciously holding resinous compound which will resist a solution of 10 per cent. nitric acid for two or three hours, and then only show its action in minute pinholes, due probably to tiny airbells in the coating. Thus it will readily be seen that with Redcol the lithographer has a very valuable addition to his forces in competition with the letterpress man. He may also do a considerable amount of local fine etching by brushing on dilute nitric acid and mopping off with a sponge, and if suitable negatives are made with a combination of cross line and Metzograph screens, fine results can be obtained in colour work. If desired, the work

can also be washed out with the usual bitumen wash-out mixture. The plate is gummed up with the thinnest possible film of gum without streaks and dried ; then the bitumen is applied as usual on a clean soft rag with a few drops of benzole added ; this addition will dissolve the redcol and the bitumen film will take its place. The plate is then rolled up in the usual manner.

A study of the Paynetype process will also show how the Redcol may be used for reversal from negative to positive, and *vice versa*. The rolling up with ink and the development with spirit may be carried out as described there ; this fact may be made use of in the so-called high-light process, with the result of saving one operation. In this process it is usual to make ordinary negatives, screen positives, and negatives from those ; now it will not be necessary to go further than the screen positive, as the reversing can be done on the plate.

I think I have said enough to show the value of Redcol in photo-lithography. Anyone comparing this method of printing with the old albumen method, with its uncertainty, its great tendency to clog up in the shadows, and the remarkable way a job would come off the plate at times, due to the ink not reaching the plate, will, I am sure, find Redcol a much more certain and controllable medium for direct photo-litho on metal plates.

WHITEHEAD, CO. ANTRIM.

E. HULTON & CO., LTD.

Photograph by
E. HULTON & CO., LTD.

Colour Schemes.

By J. S. SUNDERLAND.

THE TOPER.

ACME TONE ENGRAVING CO., LTD. Design by the BAXTER STUDIOS.

IF there is anything that is important at the present time in the process-engraving world it is colour block making by various colour schemes, and as there may be a number of readers of this book who are not familiarly acquainted with any other methods than the ordinary three or four-colour systems, as generally understood, there may be something of interest for them in this article.

Newspaper and magazine prospectors are naturally on the look out for novelties, and although the English weekly papers have not yet taken to producing colour illustrations to any large extent there is felt wanting a something which should be novel to the English public, and one may fairly well say that in this respect England is rather behind France, Germany and America. This is sure to be overcome in the near future, and among the very many ways that colour blocks may be produced the following are a few, all of which will print well on even rather cheap calendered and soft sized papers.

The making of colour blocks from ordinary pen and ink sketches may be done in many ways, and if for three colours, either a double print may be made, the first in line, the second with either half-tone or grain screen negatives for each colour. This may seem a rather long method, but in practice it is not, so as there can be stripped on one flat four or six jobs at one time and all that remains is for the etcher to stop out and work the respective colours, each, of course, being at a different angle, the same as for ordinary three-colour.

In making this class of colour blocks the originality of those in charge in assisting by suggestions the colour schemes is very helpful, because it is possible to vary and change the general character of various sets of blocks, according as the subjects may be light or heavy in style. This however may soon be brought to a definite system by always having a tabulated set of jobs that have already been done, so that there is no necessity for going over the same ground again. The use of different tint inks is a great factor in the success of this class of work.

Should, however, the matter of photographic printing on to metal for colours not be considered the best, there is the system of gumming out and laying tints in the lithographic method, which is perhaps the one most used. Although one can obtain more gradation of colour by the method of printing the colours from a screen negative, it is easier to obtain small or larger dots as required, giving the strengths of colour desired. The utilising of wash drawing in monotone for colour is also very interesting, and if it has not been tried by any one acquainted with three or four-colour work in the ordinary way it is time well spent to make

a few experiments. In many cases new styles of colour blocks could be made which would bring out some of the individuality which was seen in the days of wood engraving. Anyway, it would be good to try and break away from the monotony of the usual three-colour block as it at present exists.

There are several ways of utilising the colour filters for dividing of colours and working jobs in harmonious tints of suitable character. Working a ground tint in colour of original etching only for the white paper to show through with suitable colours of black and red is a style very suitable for coloured chalk studies and is very useful; the grain methods can be used with good effect in this case. With three-colour work oftimes the effect caused by using a blue black ink in place of the standard three-colour blue gives a character that well suits a job of turning an unsatisfactory block into one ideal for the purpose. There are so many combinations of these few systems that can be used that a good trade handbook with illustrations of these varying classes of work would be a very useful effort if undertaken with illustrations, but, as there does not appear to be anything of the kind written, the next best to do is to collect books and publications from the Continent and America which contain a goodly number of descriptions of these various styles, and worry them out, using others in combination to make variety.

One item must always be considered in these colour block systems; scarcely any are new, and as no two engraving houses would send out quite the same style of work, so this would open up a field of speciality work which should be a relief from some of the terrible competitive methods that at present exist.

Batten Castle, Plymouth.

A. Bourne & Co.

Photograph by
M. R. Tozer.

Colour Collotype.

By ARTHUR JAFFÉ, Vienna.

(Translated by R. Born.)

AN INITIAL DESIGN.

GEO. NEWNES, LTD. Photograph by ELWIN NEAME.

AMONGST the various processes of reproduction collotype is undoubtedly one of the most beautiful. Although it does not give the velvet-like depths of copper-plate prints, it is distinguished from all the other processes by a special softness of the tones. This good quality, and further, the circumstance that it furnishes without detailed and elaborate artistic help an exact photographic reproduction of the subject, caused it to be early applied to coloured reproductions. Already, before the three-colour system was generally introduced, one was able to obtain very charming effects through the combination of a multitude of tint scales.

This process was, it is true, very circumstantial and required the hand of an expert artist, who had to thoroughly retouch the negatives required for making the different colour plates.

A new and comprehensive alteration took place owing to the perception that by means of the three primary colours, yellow, red and blue, all the colour effects can be obtained, and also through the possibility of automatically cutting out these primary colours, *i.e.*, by making a selection negative for each colour.

The three-colour system found its first realization in typographic printing, where it forms to-day a special industrial branch. It was only slowly introduced in collotype. Anyone at all familiar with the difficulties of the three-colour process, who knows how exactly each individual plate must be graduated in order to produce the correct superposition of the colours in printing, and on the other hand, who is aware of the variations of the collotype process, can easily understand this.

Whilst it is easy for the typographic printer to obtain thousands of prints from his blocks, all similar to the scale print, which serves him as model, the collotyper has to combat with considerable difficulties in printing the edition. His printing forme is gelatine, which is greatly influenced by the conditions of dampness and temperature reigning in the work-room. As it is difficult already in black printing, where one print is similar to the other, to obtain an uniform edition, the even printing of the colour plates is the more difficult and requires a very smart expert.

No less difficulties are offered by the production of the colour plates. Colour negatives are made from the originals. The decomposition of colours succeeds owing to the excellent sensitizers, which are known to-day in connection with highly sensitive gelatine emulsion in a high grade of perfection. Nevertheless a very imperfect result would be obtained in most of the cases if the plates were printed without previous retouching of the negatives. This has its reason in different things, above all in the imperfection of the tone reproduction of our

photographic plates. It is well known that a photographic plate does not correctly reproduce very dark and very light tones, when they have to appear together on the same negative. Whilst the middle tones appear correctly, the darker parts come out too heavy and the light ones too monotonous.

This phenomenon is the less the finer grained the plate is, but can, however, never entirely be removed. The defect shown in the negative is doubled through the appearance of the same defect in the collotype plate. The collotype process, therefore, shows in the lights a flattening of the tones and somewhat too heavy shadows. In monotone colour printing one gets over this difficulty through the retouching of the shadows and addition of fine high-lights in the negative, where it is necessary.

In colour printing, however, this phenomenon causes difficulties of which I will illustrate an instance. Suppose a light rose tint has to be reproduced. The red printing plate is on this spot a little more transparent to the light, than in the pure white, the blue and yellow printing plate is here as strongly covered as in white. But now the gradation in the light tones is flat, red will therefore not appear vigorously enough on the printing plate, whilst the blue and yellow plates do not show a perfect white in this spot, but adopt a light tone, which, of course, will make the rose to appear dirty in the printing. This is the case with all the tones. To this is to be added that the printing inks used are not spectroscopically pure and their mixture does not produce so pure tones as the optical mixture of the coloured rays of light. The conclusion of the foregoing is that the picture will not show in rough printing the pure colours of the original.

Now the work of the retoucher comes in, and he has the task, after due consideration of all these qualities of our material for reproduction, to apply to the negatives the necessary corrections. Until ready, more or less proofs have here to be taken, which means much more to the collotyper than to the colour etcher. Whilst the latter can make his corrections on the printing plate, the collotyper has to take the negatives, retouch and print them every time anew, and then proceed to the time-consuming proof taking. Even with the most careful treatment it is necessary, according to the nature of the original, to adopt one or more colour plates.

These auxiliary colour plates prove themselves to be especially valuable for the reproduction of old masters, a grey, a brown or a flesh-tone used for assistance often brings us much nearer to the darkened parts of old pictures.

Very important for a good collotype colour print is the correct selection of the colours, which have to be adapted according to each picture. Unfortunately the most beautiful and purest colours are useless for this purpose, because they contain aniline and, therefore, are not permanent. The percentage of aniline at once makes itself known, due to the colour solubility in water; that is to say, the damp gelatine film attracts the aniline dye, and is therefore tinted over the whole surface, which also confirms the uselessness of the aniline dyes. We therefore have no other resource than pure earth colours, in the manufacture of which for colour collotype, a large number of firms are already occupied.

It is clear that with all the above-mentioned manipulations which claim very much time and labour, the reproduction of a colour collotype print is very expensive.

It is true that the price is distributed better with a larger edition, *i.e.*, 1000 and more prints, so that a single copy does not come out too expensive. Nevertheless it does not approach the price for which a three-colour block print can be obtained.

Here the question suggests itself, as to whether the expensive way of

reproduction is justified by the quality. This is already confirmed by the ever-increasing demand for these printing products, and colour collotype has already conquered spheres in which neither photogravure in colours nor chromo-lithography will supersede it. Photogravure in colour gives with its deep shadows and the delicate colouring a very pleasing effect to the eye, but can never be a true reproduction of the original, as the pad with which the copper-plate printer has to paint the individual colours on to the plate does not allow this. After all, a single copy of a nice photogravure in colour requires four to eight hours' work; this process therefore is by far the most expensive one of colour reproductions. Let us compare a colour collotype with a photogravure in colour, and at once the wonderful softness of the first and the unity of tint strikes the eye. Of course, no screen disturbs us here. A fact which also is to be welcomed very warmly is the possibility of printing collotype on any rough paper, which is not possible in typographic printing. It is a recognised fact that a smooth coated surface paper, as required for typographic printing, is much less fit to serve as a base for art printing than a paper with a natural surface.

Ilfracombe Harbour.

Wallage & Gilbett, Ltd.

Photograph by
W. P. Thomson.

E. Hamel & Co.

Design by The Carlton Studio

Would Advertising help Conscription?

A Cartoon reproduced in the "Sphinx" Club Magazine on the occasion of a discussion on the above subject.

A Graphical Construction for Determining the Optical Constants of a Thick Lens.

By REGINALD S. CLAY, D.Sc.

LAST year I published in this annual a graphical method of obtaining positions of the principal points and principal foci for two thin lenses at a distance a apart. I propose now to show how to extend the method to the case of a thick lens. I will begin with a single refracting surface separating two media of which the refraction indices are μ_1 and μ respectively. If a beam of axial parallel light in the medium μ_1 falls on the surface it will diverge or converge in the medium μ as though it had come from a point which we will call the second principal focus of the surface; the distance of the point from the surface we will call the second focal length e_1; e_1 is then the focal length in the second medium for light parallel in the medium μ_1; e_1 is positive for a divergent surface as it is measured towards the incident light.

If the surface were a convergent one the focus would be on the other side of the surface and e_1 would be a negative quality.

So if light in medium μ_1 is after refraction to form a parallel beam in the medium μ, it must have been converging before refraction to a point behind the refracting surface which we will call the first principal focus. The distance of this point from the surface is the first focal length g_1. g_1 is thus the focal length in the first medium μ_1, corresponding to parallel light in the medium μ. It is negative for a divergent surface.

Measure e_1 and g_1 from A along A E_1 and A D to E_1 and G_1 respectively. As g_1 is negative the point G_1 will be below A. Complete the rectangle A E_1 H_1 G_1.

Let u be the distance of some object from the surface A. Measure u along the axis A D to D. Join H_1 D cutting A E_1 at C. Then A C is the distance v_1 of the image from A. As A C is measured to the right (*i.e.*, in the positive direction) the image is in front of the surface.

If the surface were convergent the point H_1 would be in the upper left hand quadrant.

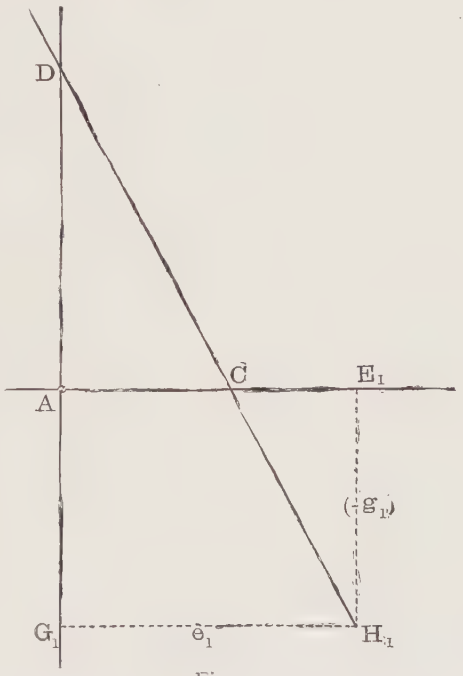


Fig. 1.

Thick Lens. Principal Foci.

Let there be a second coaxial surface B at a distance t from A, separating the medium μ from a medium μ_2.

Let the focal lengths be e_2 in medium μ for light parallel in medium μ_2, and g_2 in medium μ_2 for light parallel in medium μ. If the surface is a divergent one g_2 is positive and e_2 is negative.

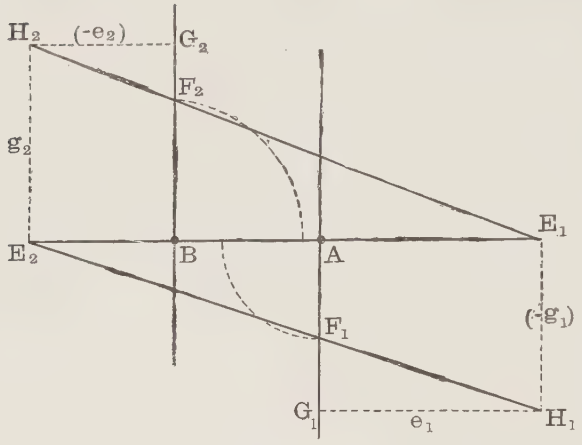


Fig. 2.

Measure A B a distance t, along the axis from A, and draw a vertical line through B. Measure g_2 and e_2 from B along B G_2 and B A, to G_2 and E_2 respectively. As e_2 is negative, E_2 is to the left of B. Complete the rectangle B G_2 H_2 E_2.

The focal points of the combination are found by joining E_1 H_2 cutting B G_2 in F_2, and E_2 H_1 cutting A G_1 in F_1. Project F_2 and F_1 on to the axis clockwise.

Thick Lens. Nodal Points.

Join H_2 H_1 cutting the verticals through A and B at N_1 and N_2 respectively. Project N_1 and N_2 clockwise on to the axis.

N_1 F_1 will be the second focal length f_2, *i.e.*, the focal length in μ_2 corresponding to parallel light in μ_1. So N_2 F_2 is the first focal length f_1.

Thick Lens. Principal Points.

These may be obtained in two ways.

1. Having found the focal and nodal points as above described, measure the distance N_1 F_1 from F_2 to P_2, and the distance N_2 F_2 from F_1 to P_1. Project P_2 and P_1 clockwise on to the axis. (Fig. 3.)

2. With A E_1 and B E_2 as basis complete the squares A K_1 and B K_2. Join K_1 K_2 cutting the axis at P. Join P H_1 and P H_2 cutting the verticals through A and B at P_1 and P_2 respectively. Project clockwise on to the axis.

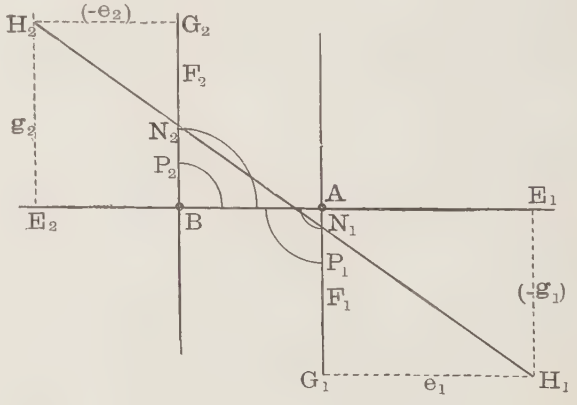


Fig 3.

As the focal lengths are measured from the principal points to the focal points, the second focal length is positive and the first negative in the above figure. The combination is therefore divergent.

Formulæ.

Some simple formulæ follow very easily from the above constructions.

Let the distance $E_1 E_2$ be called k, *i.e.*, the distance from the principal focus of the surface A, for light parallel outside the combination, to that of the

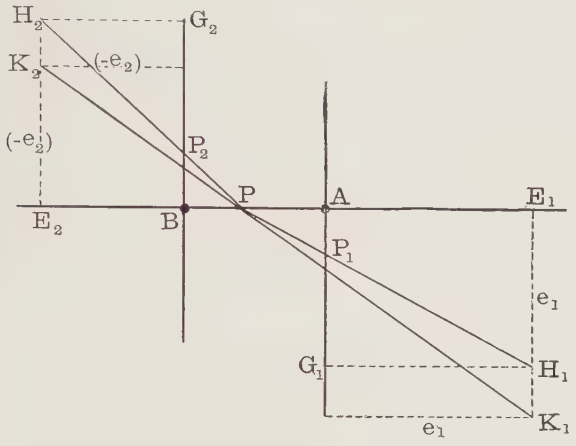


Fig. 4.

surface B, also for light parallel outside the combination (k is positive if E_1 and E_2 are in same order as the surfaces A and B). Then by similar triangles.

$$\frac{-f_1}{-g_1} = \frac{-e_2}{k} \quad ; \text{ or } f_1 = \frac{-g_1 e_2}{k} \qquad \frac{f_2}{g_2} = \frac{e_1}{k} \quad ; \text{ or } f_2 = \frac{g_2 e_1}{k}$$

$$\frac{G_1 F_1}{-g_1} = \frac{Z_1}{-g_1} = \frac{e_1}{k} \quad ; \text{ or } Z_1 = \frac{-e_1 g_1}{k} \qquad \frac{G_2 F_2}{g_2} = \frac{-Z_2}{g_2} = \frac{-e_2}{k} \quad \text{or } Z_2 = \frac{g_2 e_2}{k}$$

$$A F_1 = \frac{-g_1 (t - e_2)}{k} = (-p_1) + (-f_1) = -p_1 - \frac{g_1 e_2}{k} ; \text{ or } p_1 = \frac{g_1 t}{k}$$

$$B F_2 = \frac{g_2 (t + e_1)}{k} = p_2 + f_2 = p_2 + \frac{g_2 e_1}{k} ; \text{ or } p_2 = \frac{g_2 t}{k}$$

Where Z_1, Z_2, are the distances of the principal foci of the combination from those principal foci of the surfaces which correspond to light parallel within

the combination ; and p_1 p_2 are the distances of the principal points from the surfaces, all being positive when measured towards the light.

It follows from the relation

$$\frac{-p_1}{-g_1} = \frac{t}{k}$$

that the line A P_1 is parallel to the line H_2 E_1, which gives still a third method of determining the position of P_1 ; also, of course, B P_2 is parallel to E_2 H_1.

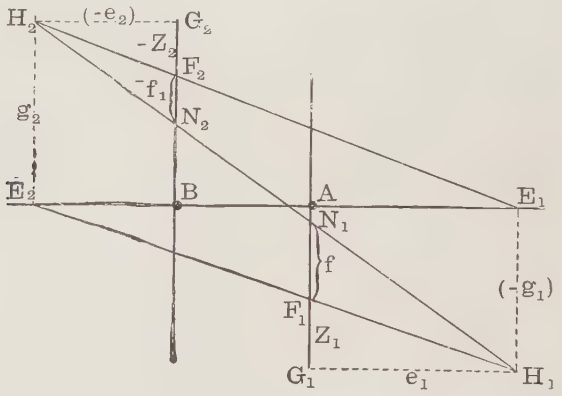


Fig. 5.

To find the conjugate focus of an object at a given distance from A, measure this distance from A to R_1. Join R_1 H_1 cutting the axis at Q. Q is the image of R_1 formed by the surface A.

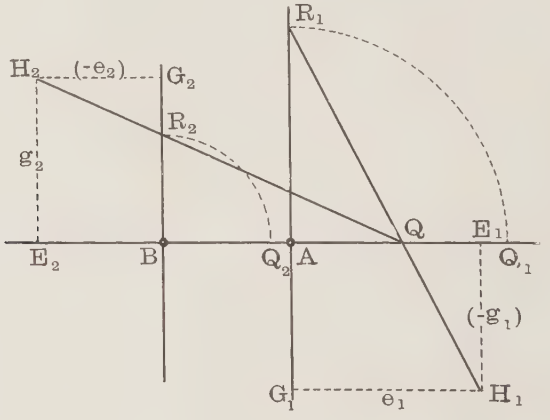


Fig 6.

Join Q H_2 cutting the line B G_2 in R_2. Then B R_2 is the distance of the focal image from B, and its position is found by projecting R_2 clockwise on to the axis to Q_2. Thus Q_1 Q Q_2 are the actual positions on the axis of the object and its successive images.

Amalgamated Press. Ltd.
(Process Department.)

A Greenhouse Study.

Reproduction of Chromotypes obtained with Autochrome Plates.

By A. SEYEWETZ, Lyons.

1.—Reproduction by Camera.

"All British."

A. E. Dent & Co., Ltd. Photograph by Thos. Fall.

THE principal methods which have been advocated up to now for the reproduction of chromotypes obtained with Autochrome plates, require the use of a camera, furnished with a lens for the formation of the image of the chromotype on the sensitive plate, upon which it is to be reproduced. This reproduction may be of the same dimension as the original, or a reduction of same.

For this purpose a camera is used with three bodies, placing in the rear body of the camera the chromotype to be reproduced, which is illuminated by daylight reflected from a white screen. The middle body is fitted with the lens, to which is attached the special screen. The image of the chromotype is formed in a suitable size on the ground glass, for which is afterwards substituted the dark slide containing the sensitive plate, the latter being exposed through the back for a time varying in accordance with the intensity of the daylight.

Instead of using a camera with three bodies, one can also operate in a dark room, pierced in one of its walls with an opening in which the chromotype to be reproduced is fixed. The image is formed in the desired size on the ground glass of a camera on which the lens is provided with the special screen (Auer screen); then the ground glass is taken away and the dark slide containing the Autochrome plate is put in its place.

These processes for reproduction by employing daylight as source of illumination, do not give constant results with one and the same screen. According to the hour of the day and the state of the sky, it is necessary to use a screen which is lighter or darker, without which some predominant colours are easily obtained.

It has been attempted to remedy this inconvenience by using a source of constant artificial light, *viz.*, an Auer burner, diffusing the light either by transmitting it through a ground glass, or by reflection, using a uniformly illuminated surface. Although this last method of illumination gives better results than the first, one always obtains in operating with camera and a luminous source of light, images which are deficient in continuity in the darker half-tones.

2.—Reproduction by Contact.

The process of reproduction with the camera can easily be substituted by the simpler process of contact, in which the optical image does not intervene.

Many experimenters have pretended that the reproduction by contact could not lead to good results on account of the *non-coincidence* of the coloured grain of the initial plates with that of the plate to be impressed.

This objection has no foundation if it is considered that all circles of which the diameter is less than $\frac{1}{10}$th mm. seem to be a mere point to the eye ; now, in a circle of $\frac{1}{10}$th mm. there are about sixty coloured grains, since the diameter of these is about $\frac{1}{75}$th mm. It does not then much matter if in this point comprising sixty grains, there be a co-incidence or not between the coloured grains of the original and of the reproduction, as long as the resultant colour remains the same.

Experience, further, confirms perfectly this way of looking at the matter, as very good reproductions can be obtained by contact.

Messrs. Lumière have experimented in this way with divers arrangements.

In order to eliminate the inconveniences resulting from the use of daylight they have used only a source of artificial light.

(a.) Employment of the Auer Burner.

At first Messrs. Lumière used as source of light an Auer burner, around which was an opaque chimney (of tin, for instance), provided with an opening of the dimension of the bundle of rays, and before which was placed a ground glass, together with the special screen for the Auer burner. This screen is placed at a sufficient distance from the flame of the burner to avoid heating.

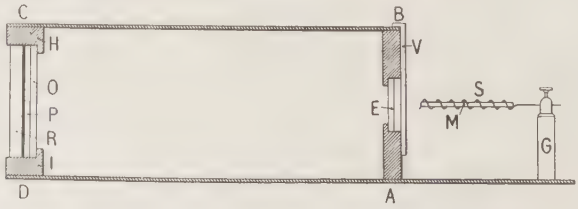
The light source is spread out by means of a simple lens in such a way that it illuminates a surface, which is notably larger than that of the image to be reproduced (18 by 24 cm. for reproducing an image 13 by 18 cm.).

Further at the conjugate focus of the luminous source is placed a printing frame, without a glass, containing the plate to be reproduced, of which the glass side is turned towards the luminous source, whilst the image is in contact with the glass side of the plate to be printed. The time of exposure is rather short.

This process gives very good reproductions from the point of view of the exactness of the colours and the relative value of the half-tones, but the images are not sharp. Indeed, the sensitive film and the image are separated by the whole thickness of the glass, which causes a noticeable diffusion of the light ; in addition, there are the inconveniences of parallax, resulting from the use of a light source having certain dimensions. These two causes contribute towards giving an unsharp picture.

(b.) Use of Magnesium in the Form of a Point of Light.

Messrs. Lumière have been able by using the magnesium light to devise an arrangement which is very simple, and which does not present the inconveniences of the preceding method, whilst permitting the reproduction of the Autochrome proofs to be done with the greatest ease.



A rectangular wooden box A B C D, 40 cm. long, light-proof, and blackened inside to avoid reflections, has in its back C D an opening in which is fitted a

special screen E, destined to give an exact orthochromatic effect with the magnesium light. This aperture can be opened and closed at will with the aid of a shutter V, which slides into a groove.

In the back of the box is put a hermetically closed frame H I, in which is placed first the chromotype to be reproduced O, the glass side in front, *i.e.*, looking at the surface C D, and also the not yet exposed Autochrome plate P, the glass side being in contact with the chromotype, and then the usual black cardboard. The frame is closed with the aid of the shutter R.*

A movable support G carries a spiral of iron wire, S, placed horizontally in which the magnesium ribbon M is placed during the burning. The iron wire spiral is meant to give the necessary rigidity to the ribbon. The support is placed at a certain distance from the front of the box and in such a way that the magnesium ribbon is on a level with the centre of the screen.

The iron wire spiral must have a diameter of 0,3 to 0,5 mm., and be fitted in such a manner that there is one turn of the spiral per centimetre of the length of magnesium ribbon.

The magnesium ribbon is cut to a suitable length (of 10 to 20 cm. approximately for a ribbon of 2½ mm. breadth), in accordance with the opacity of the image to be reproduced. Further, it is folded in the middle in order to obtain half the length, and it is placed inside the spiral of iron wire, the *surface of the ribbon being in a vertical position.*

If, for instance, a magnesium ribbon is taken of 16 cm. length, this, folded in two will be 8 cm., and will have to correspond with eight revolutions of the spiral.

It is necessary to observe this rule well, so that the conditions of combustion of the magnesium are invariable, greater or less rapidity of burning being likely to spoil the results.

The support is placed in such a way that the end of the magnesium ribbon is at a distance of 5 cm. from the screen and exactly in the centre of the box. Whilst the shutter V is closed the magnesium is lighted with a candle and the shutter immediately raised. The combustion finished the plate is treated as usual.

The time of exposure, that is to say the length of the ribbon to be used, can easily be determined by a previous trial. It must be as exact as possible to obtain a good reproduction.

Of course the operation has to be done with all other light excluded except the magnesium.

Note.—Care should be taken not to substitute copper or brass wire for the iron wire, and also the diameter of 0,3 to 0,5 mm. must be kept to as closely as possible, as this is suitable for a magnesium ribbon of 2½ mm. breadth. The apparatus is so simple that anyone can fix it up with the greatest ease. As to the spiral, it is simply obtained by winding an iron wire around a cylindrical rod of 3 or 4 mm. diameter, so that the turns of the spiral are equal ; the rod is withdrawn and the spiral slightly stretched. When the magnesium ribbon has been placed inside it is stretched again until it has the required dimension, that is to say, until the coils of the spiral are successively separated by a distance of 1 cm.

* This box can be substituted by an ordinary camera (from which the lens has been taken away) having a sufficient opening provided with a holder deep enough to carry two superimposed plates.

The Off-set Press applied to Photochrome.

By J. WIDDOP.

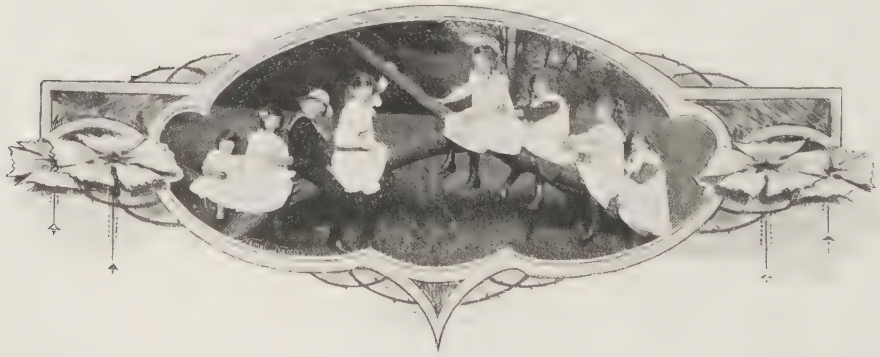
DADDY.

MARSHALL ENGRAVING CO. Photograph by W. T. GREEN.

PHOTOCHROME has been a gigantic success in the hands of several Swiss and German firms, who have not only made an enormous demand for the work done by this beautiful process, but have found it most profitable, as it is work that sells, not so much per thousand, but so much per copy. Why, then, has it been entirely neglected by English firms? I only know one British firm who have ventured and made a success of it. This is much to be regretted, as it might be used with great advantage by all good class lithographic firms, for the process is easy to work and the outfit not at all costly, whilst the results are far better than can be obtained by any other process of colour printing, with the exception of colour-gravure. Lately the lithographic trade has been hard hit by low prices and bad trade, but the off-set press combined with photochrome, in the right hands, should bring a new lease of life to the lithographic trade.

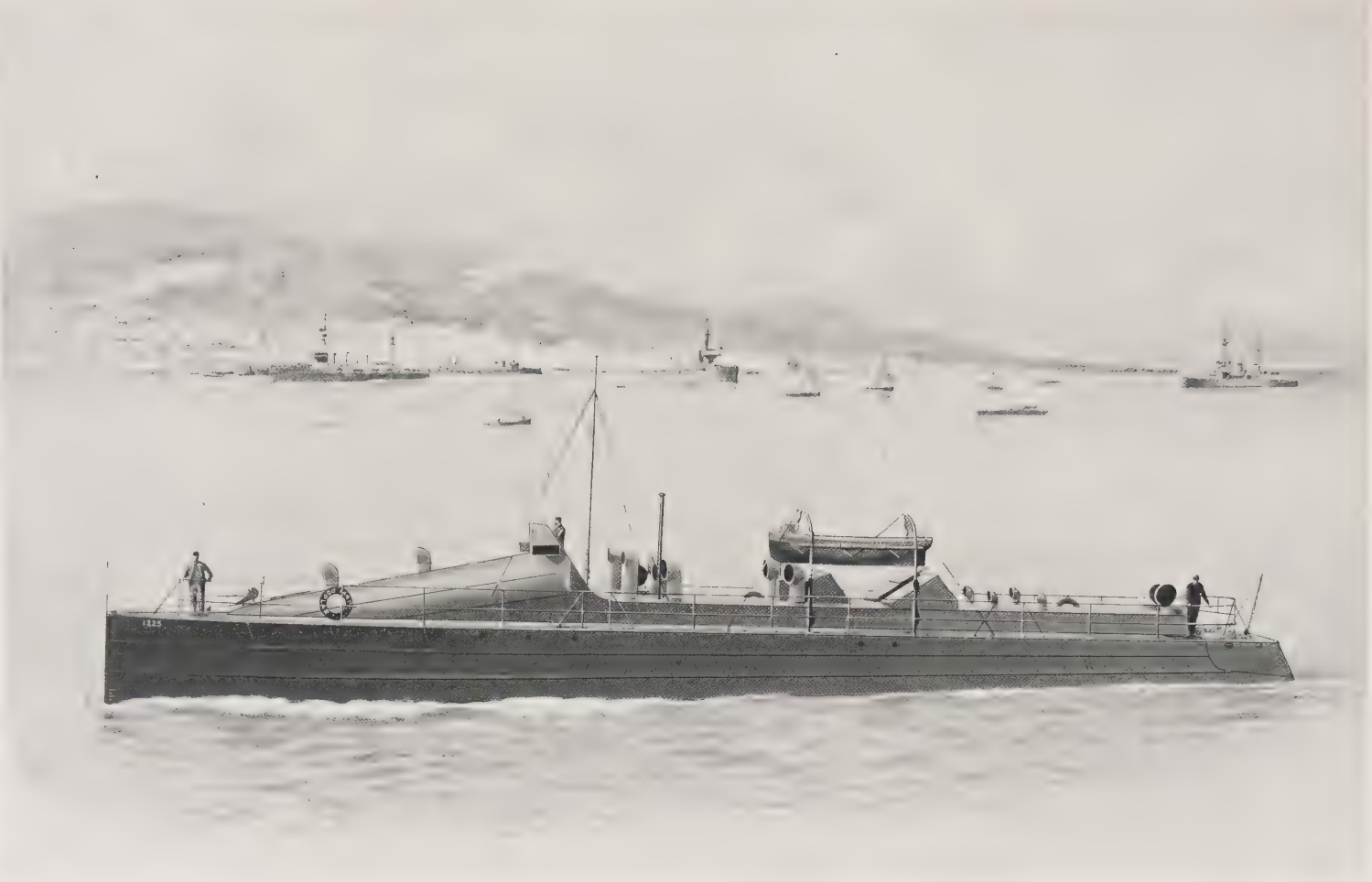
It is not confined to views and pictures, but can be used for show cards, pictorial book work, illustrated sheets, etc., and the finest illustrated coloured catalogue the writer ever saw was done by this process.

The beautiful softness of good photochromes would be much enhanced by being printed from the rubber of the off-set press.



Half-tone on Copper by E. HAMEL & Co.

Photograph by FRECKLETON & Co.

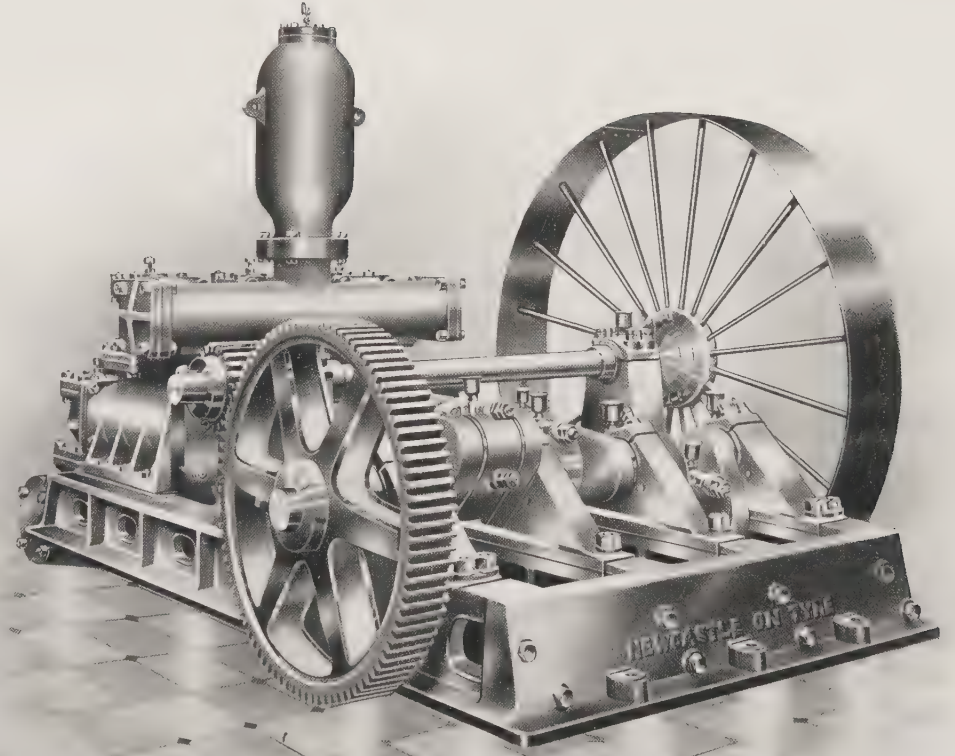


Wallage & Gilbett, Ltd.

By permission of S. F. Edge, Ltd.

A Catalogue Illustration.

The Motor Boat is from a retouched photograph, the background being worked in by pencil.

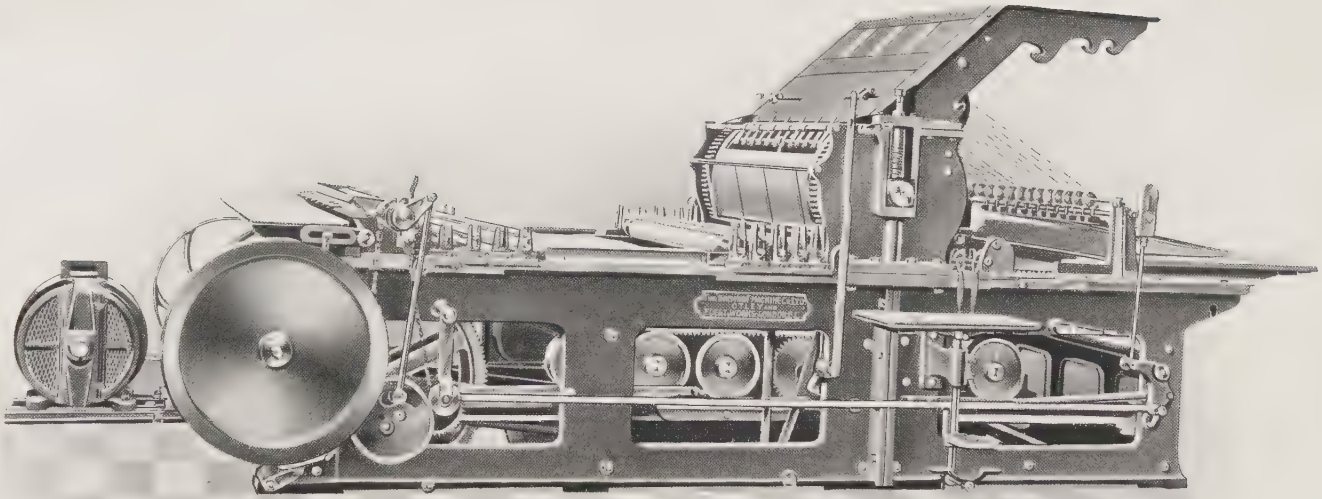


Philipson, Son & Skilleter.

Catalogue Illustration.

From an Electro by
Badoureau & Jones Ltd.

A Quiet Hamlet.



Gilchrist Bros.

Photograph and Retouching by Gilchrist Bros.

Catalogue Illustration.

By kind permission of the Bremner Machine Co., Otley.

Orthochromatic Filters.

By C. E. KENNETH MEES, D.Sc.

CHURCH OF ST. PAUL, ANTWERP.

MARSHALL ENGRAVING CO. Photo by GODFREY BINGLEY.

THE majority of photographic workers are now using orthochromatic filters for the purpose of obtaining some better rendering of the objects which they photograph than would be obtained by the use of orthochromatic plates without a filter.

It is of importance to everybody who uses orthochromatic filters that they should know that the filters which they use are of the best type, and it is of importance for this reason—that the plates which are commonly used for orthochromatic work are by no means too perfect, and great dependence is placed on the filters, so that if these are not perfect in their functions, the results will not be satisfactory. Orthochromatic filters have been talked about a great deal, but the attention which has been paid to the adjustment of them to the requirements of the practical worker is by no means commensurate with the subject. The conditions which must be fulfilled as to colour in first place, are, even now, not so fully understood as they should be. This is shown by the continual reference to the adjustment of filters to plates, and also by the large number of unsatisfactory filters which are still in use.

There are three conditions as to the colour of the filter, which a satisfactory orthochromatic filter must fulfil. These three conditions have relation to—

(1) the complete absorption of the light belonging to the part of the spectrum which it is to absorb ;

(2) The partial absorption of the light which it is not to absorb completely, but which it is to diminish, and

(3) The non-absorption of the light which it should transmit.

White light consists of a mixture of light of many different colours, and it is convenient to consider light as composed of three roughly equal portions, *viz.*, red, green and blue-violet, which it is possible to use separately. If by means of a spectroscope light is split up into its constituent components, it will also be found that, beside the visible violet showing, there is something beyond the limits of the light which we can see ; light which is invisible to the eye, but which produces a considerable effect on a photographic plate exposed to it, and which is called the " ultra-violet."

As this ultra-violet light has an effect upon the plate, it is of interest to find out how much of the effect produced in ordinary photography is due to ultra-violet light. This has been investigated for daylight by Ives of America, and also by Dr. Sheppard and myself, and we are practically agreed with Ives, that if no glass were used, about two-thirds of the whole effect on the ordinary plate was due

to the ultra-violet light, but if a sheet of glass were used, that one-third of the whole effect was due to the ultra-violet light.

Messrs. Newton and Bull showed that the ultra-violet was of even more importance with enclosed arc lamps and wet collodion, and first called attention to the use of quinine and aesculine filters.

Now this effect of the ultra-violet light has a very disastrous effect on the colour rendering. It is light which is quite invisible to the eye, its effect on colour cannot be gauged, and it entirely falsifies the tones. We can see the importance of this effect from some experiments published by Messrs. Newton & Bull with Chinese whites. They took patches of these whites, making a sort of chart of various Chinese whites, the ordinary Chinese white, Albanine, Reeve's special white, and others, and photographed them upon a wet plate with an enclosed arc. The effect produced was that the Chinese white and one of the process whites did not photograph as whites, but as greys, showing that these so-called whites strongly absorb the ultra-violet light, and the effect produced on the plate therefore is that of an entirely false rendering. It was also shown that this defect can be avoided by the use of a filter.

A filter of Aesculine has, when made, no tinge of yellow in it, but it cuts out the whole of the ultra-violet completely, and when used with Chinese white it avoids the greyness produced by the absorption of ultra-violet light.

The best way to determine whether the ultra-violet light is removed by a filter is to take a photograph of the spectrum, best of an enclosed arc, through the filter. This method is a most final and satisfactory one, but unfortunately the number of people who possess a spectroscope is very limited, and I have therefore devised an apparatus which enables us to see at once whether a given filter passes ultra-violet light or not, without recourse to the spectroscope.

A piece of gelatine containing Aesculine is strongly fluorescent when ultra-violet light falls upon it. By fluorescence I mean the change of light to a higher colour in the spectrum. When, for instance, blue light falls upon Eosin, it changes blue light into green light. Aesculine absorbs ultra-violet light and changes it into fluorescent blue light.

A fluoroscope can be made from a box with two holes in it; in front of one hole is put a piece of blue film, in front of the other in the side, at right angles to the first, there is a little narrow strip of Aesculine filter. If the hole opposite to the narrow strip is held to an arc light or direct sunlight, the Aesculine strip, viewed through the hole covered with blue film, will be seen to fluoresce strongly. If we put over the hole, in the path of the light falling on the Aesculine, anything which absorbs the ultra-violet light, the fluorescence will disappear. If we place a filter which absorbs the ultra-violet in front, the fluorescence will at once disappear. If, on the other hand, the filter transmits the ultra-violet light, it will not disappear.

In this way it can be shown that filters made from tartrazine do not completely absorb the ultra-violet light, while lighter filters made from Filter Yellow K. absorb it completely. The only K. filter in fact which transmits any ultra-violet is a very light one, which transmits less ultra-violet than does a deep tartrazine filter or a filter made from any other dye.

A rather better weak filter could be made by the use of a weak solution of picric acid, but unfortunately picric acid cannot be trusted to keep, and it would not be advisable to use a filter of such a nature, so that though a filter of this kind might be used under laboratory conditions, it cannot be applied generally.

We see, then, that with the fluoroscope, we have a satisfactory means of investigating the amount of ultra-violet light transmitted by any filter. An incidental application of this may be made to the red glass used in lamps. We are

often told that glass for lamps has been spectroscopically tested; a thing not very easy to do, but by the aid of the fluoroscope a test proves comparatively easy of accomplishment.

The second point is this. We must not only absorb the ultra-violet light with the filter, but we must diminish the blue and violet light which would otherwise produce too great an effect upon the negatives compared with the effect seen by the eye, because of the much greater sensitiveness of the photographic plate to violet and blue than to green and red. The filter will be yellow, this being the colour which shows absorption of violet and blue. It is important, however, that we should not completely absorb either violet or blue. Blue is comparatively bright to the eye, violet is dark, but it is not black, and it is necessary, to get a truthful rendering, that our filter should distinguish between blacks and violet. Violet should be rendered as a very dark grey. This means that our filter must not have a sharp absorption completely removing part of the spectrum; it must be a gradual absorption removing blue and violet without removing them completely. In order to find out whether the filter has too sharp an absorption, we may examine it through a filter which is of a deep violet colour. Such an one, when examined through the filter, should show some light on the screen, and that light should be violet light. When looked at through the filter, the filter should appear to have some little violet in it, and not be completely dark or red.

A blue filter should, in the same way, appear a bluish green, it should not appear a deep green.

This, then, is our second test, that our filter should not absorb the whole of the visible violet, so that the violet should appear in a photograph as a very dark grey, not black.

The third point is that our filter should not absorb any green or red. Absorption of the green or red means wasted light, that is to say, it means the absorption of light by the filter which is needed for making photographs. If we examine it through a strong yellow filter, it should not produce any visible absorption on it. Yellow light consists of a mixture of red and green light, and the yellow filter transmits a mixture of red and green. A number of filters on the market will be found to absorb light which should be transmitted. Green filters absorb red light. When used for plates which are not sensitive to red this can scarcely be considered a disadvantage; it is, of course, not an advantage. Brown filters absorb green light, they also generally absorb some red. Brown glass filters also have the disadvantage that they usually imperfectly absorb the ultra-violet.

We see, then, that satisfactory filter must (1) absorb the whole of the ultra-violet light, (2) must not absorb the whole, but nearly all, the violet and blue light, and (3) must not absorb the red and green light required for the formation of the image. It is sometimes stated that special filters are adjusted to special plates—a statement which requires consideration at this point.

The object of using filters at all is to obtain a closer approximation of the relative brightness of colours as seen by the eye than that given by the plate itself. Now, if we have a plate which is sensitive to the whole spectrum, that is, a panchromatic plate, we can obviously adjust a filter to remove the excess of sensitiveness to violet, and adjust the sensitiveness in the blue and green; so that the curve given by the plate is of the same type as that obtained by the eye. Such a filter is said to be adjusted to the plate. But a plate which is orthochromatic, that is, which is sensitive as an ordinary plate to the violet and further to the yellow-green only, cannot be adjusted to the luminosity curve of the eye except by a filter which would absorb to such an enormous extent that it could

scarcely be used. All that can be done with a common orthochromatic plate, not sensitive to red, is to make a filter conforming to the requirements given above, which shall absorb the ultra-violet, and shall not absorb too completely the violet and blue. So that with an ordinary green-yellow sensitive orthochromatic plate no filter can be said to be really adjusted to it.

There is one point in connection with the examination of a filter which is of considerable importance. It is necessary not only that a filter should be right in colour, but that the glass of which it is made shall be of such satisfactory optical quality that the definition will not suffer by the placing of the filter on the lens.

In order to test a filter for any defect in this respect, a piece of cardboard, from which white cross lines have been cut out, is placed so that it is well illuminated, and the image of the cross reflected in the filter is observed by holding the filter down and looking into it at the illuminated cross. When you examine, *e.g.*, a yellow filter in this way, you will see two images of the cross, one coming from the front surface, which will be white, and another coming from the back surface, quite yellow. If, as you move the filter about so that the cross falls on different portions of the filter, these two images remain constant with regard to each other, then the filter is only wedge-shaped and the double image does not matter, but if they vary with regard to each other, then the filter is not satisfactory, and will produce distortion to some extent. Commercial filters at low prices cannot be made of the accuracy of lenses, but all filters should fulfil this test to this degree.

If filters are required of high accuracy, to work with long-focus lenses, then they must be obtained cemented in special optical flats, *i.e.*, glass which has been carefully worked by skilled hand labour until the surfaces are absolutely plane and parallel, an operation which is nearly as difficult as working a lens to its correct curvature, hence such filters are necessarily expensive.

"Waiting for the Smacks."

E. Hulton & Co., Ltd.

Photograph by
K. F. Bishop.

A Direct Four-Colour.

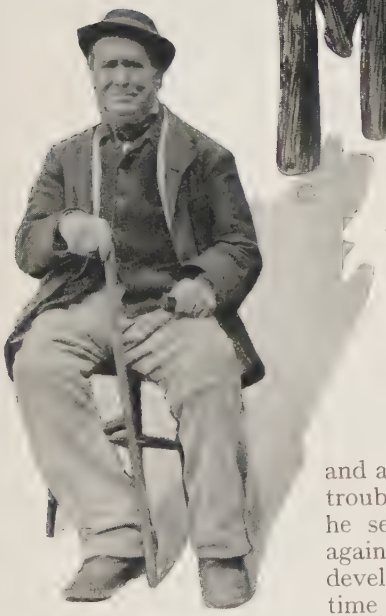
Reproduced from the Marble which faithfully conveys the colouring and characteristics of the Ston.

PRESS ETCHING Co Ltd
12 Wine Office Court
Fleet St E.C.

By kind permission of Messrs. M. & R. Moore, Marble Merchants, Times Wharf, 215, New North Road, London N.

"Dry Plate" v. "Emulsion."

By C. W. PERRY.



OLD AGE.

A. E. DENT AND CO., LTD. Photograph by W. T. GREEN.

MUCH has been said concerning this important subject, and a good deal more can be said about it, from the practical side, which is the side workmen require to consider. Theory may look all right on paper, but sometimes it does not work out in practice.

In the first place, all kinds of blocks, no matter whether black and white or colour, have to be turned out quickly and cheaply in these keen days of competition. Therefore, one must look to the cheapest and best way to produce them. Dry plates, whether you colour-sensitize them yourself or buy them commercially dyed, are very expensive, and although good work can be done by them, they are always more troublesome to the printer than an emulsion negative. When working dry plates an operator sometimes obtains a negative that is not really bad, but possible to get better, and knowing the cost of them, and also that if he has too many failures, he will get into trouble with his employers, one can hardly blame him if he sends an inferior one through occasionally. Then again, dry-plate exposures are always very long, also the developing, cutting and intensifying, not forgetting the time it takes to dry. It is quite possible to save half this time if emulsion is worked. Now regarding emulsion, of course, to work this properly and to give it a fair start one *must* work under ideal conditions; a nice clean dark-room and studio are essential, and I strongly advise one not to start this method if the above are not obtainable. By going to a little expense when first starting emulsion and keeping everything nice and clean, it will pay for itself in a very short time.

The emulsion I am speaking of is Penrose's "Non-Filter," and I must say it is the simplest and best I have used, very clean working, and, unlike many other emulsions, it is not affected by the heat of the studio. I have worked it in the summer in a temperature of over a hundred degrees and have had no trouble, the exposure ranging from two to three minutes for each plate, the heat has not time to hurt them.

Development takes place in two minutes and instead of working in the dark, as with panchromatic plates, one is able to see quite clearly what is going on. Again, time is saved in the fixing, which is a matter of a few seconds, and cutting with ferricyanide and hypo, intensifying with lead not only saves time in not

having to wash your plates like dry plates, but saves two very expensive chemicals, *viz.*, iodine and silver. When the negative is blackened with "stinko" it is as good as an ordinary wet-plate negative in every respect.

Now, looking at everything in a commonsense light, and knowing also that when one is buying dry plates one is buying glass, which one does not require, it will be seen that when one has a stock of glass for emulsion it can be used over and over again, and if an operator gets a negative that is not quite up to the mark, he could do it again without hardly any waste of time, or emulsion, as it takes very little of this to coat an ordinary sized plate.

The reader of this article must not think that I am against dry plates in any way, regarding the colour rendering; I have worked both emulsion and dry plates thoroughly and find that for colour value they are equal to emulsion.

Adding up the cost of everything, I have found emulsion is the quicker method of the two, and quite a hundred per cent. cheaper than dry plates.

The only thing required of the workman is to keep his rooms at all times clean and to always work with a method, then good results are his.

SUNSET, ILFRACOMBE.

HARRAND & FULLER. Photograph by M. HARRAND.

Colour a Creature of the Mind bound by Physical Conditions.

By EMANUEL F. WAGNER.

PREPARING FOR WINTER.

Photograph by
CHAPPELOW & Co. J. B. SABLICK.

SO far as the decorative art of a people is concerned, we may readily admit that its expression and full development depends upon dominant conditions, such as effect and shape, the religion, philosophy, habits and aims of a race or nation.

It finds its full realization in architectural display through which it again filters into the pictorial embellishments and fashions of the masses.

The massive, solid style of the Egyptian embodied the ideals of perpetuity. The mystic, purely geometric, intricate ornament of the Mohammedan was a direct result of their cult, their shifting strategic mind and their rigid religion, which forbade the imitation of anything which represented existing, living things.

The Gothic style was the very reverse of this, it dealt with the soul, with sentiments; through high arches and fluted pillars it was all symbolism and pictorial representation of ideas which were then alive in popular conception, making use of all arts, music and dress, but appealing most powerfully to the sense of colour by shedding through its artistic windows the harmonious rays of the spectrum tints.

The Chinese were dominated in their puzzling style by that which provided the most suitable material for cheap construction,—bamboo—and so on we could describe the individuality of a people by naming certain characteristics of their ornament and we can go further and trace this art or colour development, which is a vital part of each "School of Painting," and from which undoubtedly sprang all other progress and refinement.

Selection of and judgment for colour values is an outcome of temperament, just as temperament is absorbed from natural resources and surrounding conditions, and we, therefore, find that when the natural sway of passion is strong, certain aggressive colours play a prominent part in the dress, decoration and art of that people, either indulging in the vivid or "warm" colours, or departing from them and embracing the "cool" tones. It is impossible to overlook the fact that in hot countries the yellow colour dominates, anger and passion are characteristics and even animal life partakes of the selection. As the refining stage progresses red becomes the favourite dominant, the colour of life and action, and as the spiritual or mind force exerts itself the barbaric glare disappears and blue, passing

through its secondary stages of purple and violet is often brought to a point of absolute rigidity and Puritanic unfriendliness; but is finally softened in the tertiary stages by mixture with grays.

The reign of the rococo was resplendent with gold and high, gorgeous colouring and it well expressed the perverted morals of an historic age; in marked contrast to this was the period of the French Renaissance, beginning with Louis XVI., where higher ideals based upon pure morals were the dominant lines, and naturally also resounded in chaste chords of colouring.

Colour is a subtle energy—it is a sensation, and as it is more or less influenced by temperament, its manifestations are also more or less swayed by climatic, chemical and atmospheric conditions. The soft, dreamy effects of the Dutch painter are a result of the moist, vibrating atmosphere, and are in strong contrast to the lively colouring of Italy.

Even a picture produced in one locality will bear a different expression when transported to another, where such climatic conditions are changed; this principle is often made use of in the studio. The artist can gain many hints for the improvement of a chromatic arrangement by placing a weakly tuned picture in a dim light, or studying a highly-coloured piece of work in an aggravatingly strong light; the tones and tints assume different relations and the chiaroscuro a different aspect.

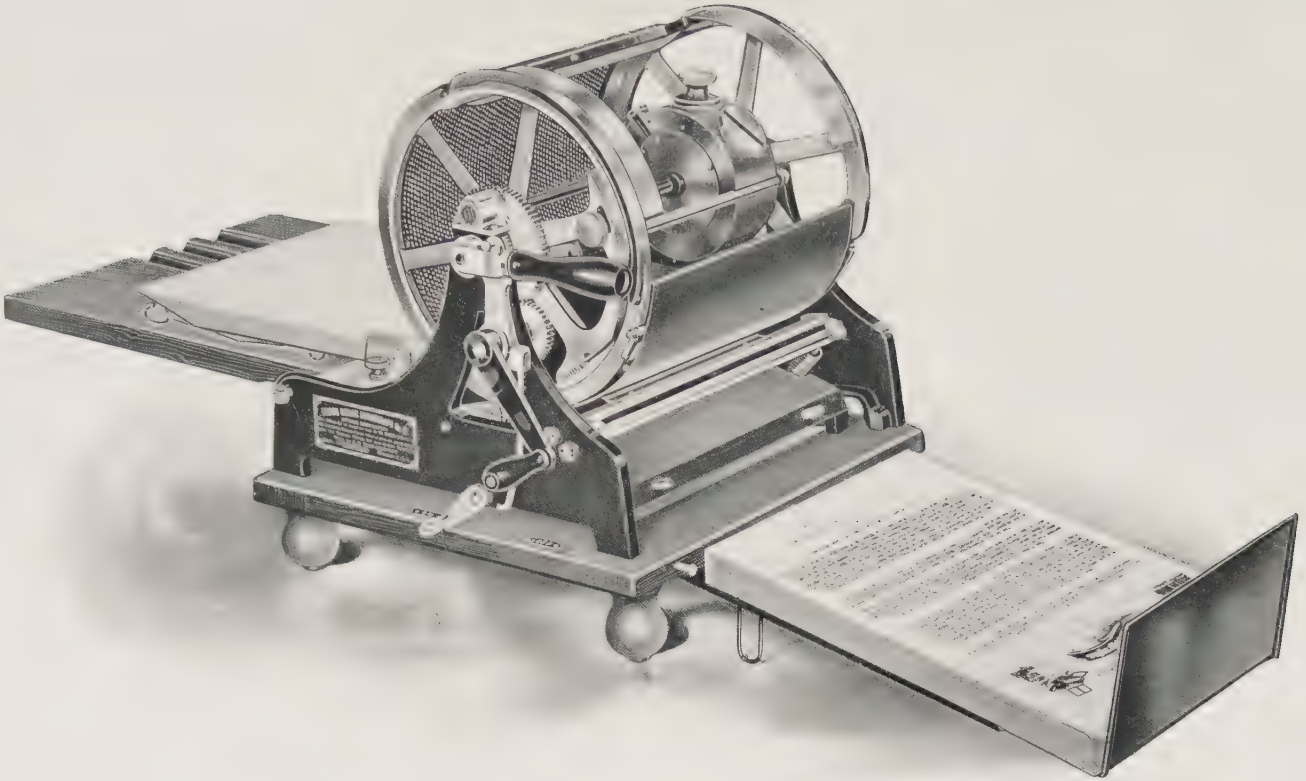
Colour is never exactly the same at different times of day, at different days, at different seasons or at different localities, and if we consider that eyes see colour differently, according to natural development or training of each individual's colour sense, we come to realize what a subtle agent of art we have to deal with.

It is, therefore, absolutely necessary that we consider this subject of colour very carefully and lay our plans systematically in order to train this sense and obtain the most satisfactory results from it. Especially those working in the printing arts should use some system by which this elusive subject can be held down long enough to be able to examine it more closely.

The main principle in this study is to classify all colour as emanating from four conditions of light, and at once label each brand with a simple sign, thus causing the mind to associate a certain meaning with this symbol and leading the student in the most practical way to *think* colour. Think of a bright red wall which is partly covered from a strong sunlight by the shadow of a house. You see two strongly marked colours of red, call the first X and the other XX, and you have a shorthand method of expressing two important conditions of colour. Now take your brush and canvas on a day when the sun is hidden by light clouds (diffused daylight), and make a picture of this same wall and compare it with the other two reds, and you have another condition of colour; mark this in your mind's eye with O. Finally betake yourself across the fields and paint this same wall from a distance, and you will have the fourth condition of colour and fix this in your memory with the sign OO.

If the artisan and craftsman, who has not had a chance to dwell upon the subject of colour long enough to encompass all its ramifications (like the artist), would take up this matter in a systematic method, as laid down in the colour compass, he could very soon be led to see colour as the musician hears sounds when seeing notes. The mind absorbs an idea quickly when assisted by a tangible form. Colours are ideas, that is, no one can be productive of colour harmonies who has no ideas of colour values.

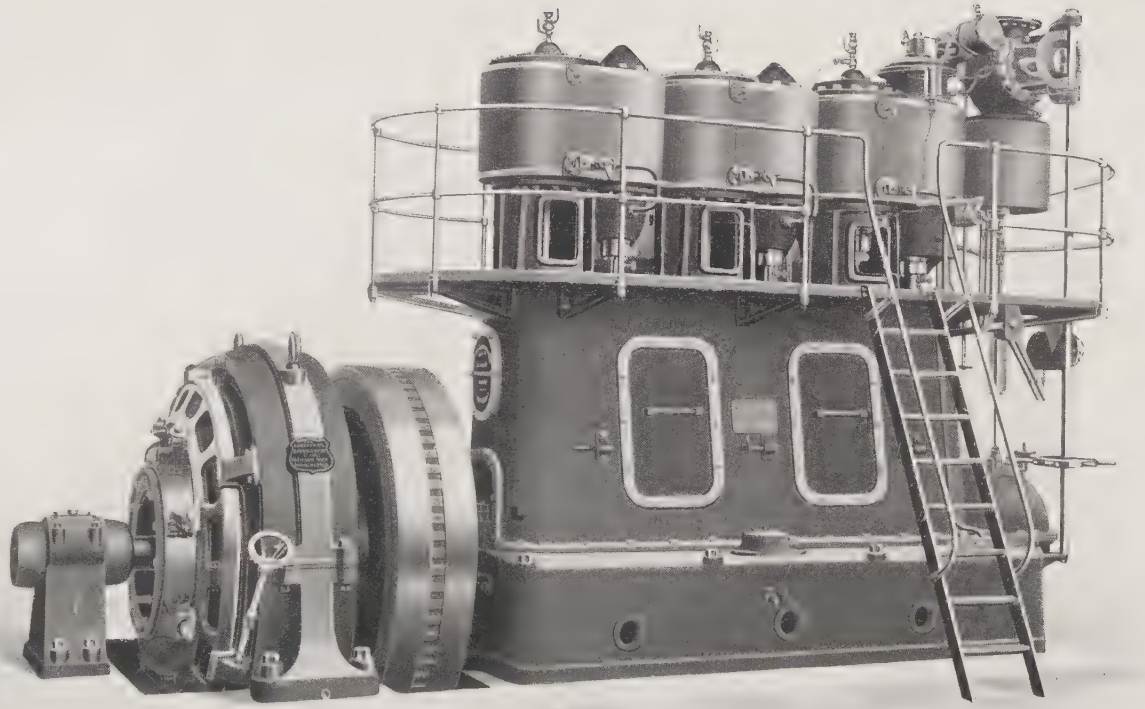
But colour ideas and values can be taught by simple means, just as writing and reading is learnt by simple forms.



C. P. Zacher & Co.

Catalogue Illustration.

Courtesy of A. B. Dick Company, Chicago, Ill.



Entwistle, Thorpe & Co.

Negative on a "Graphic" Process Plate.

Catalogue Illustration.

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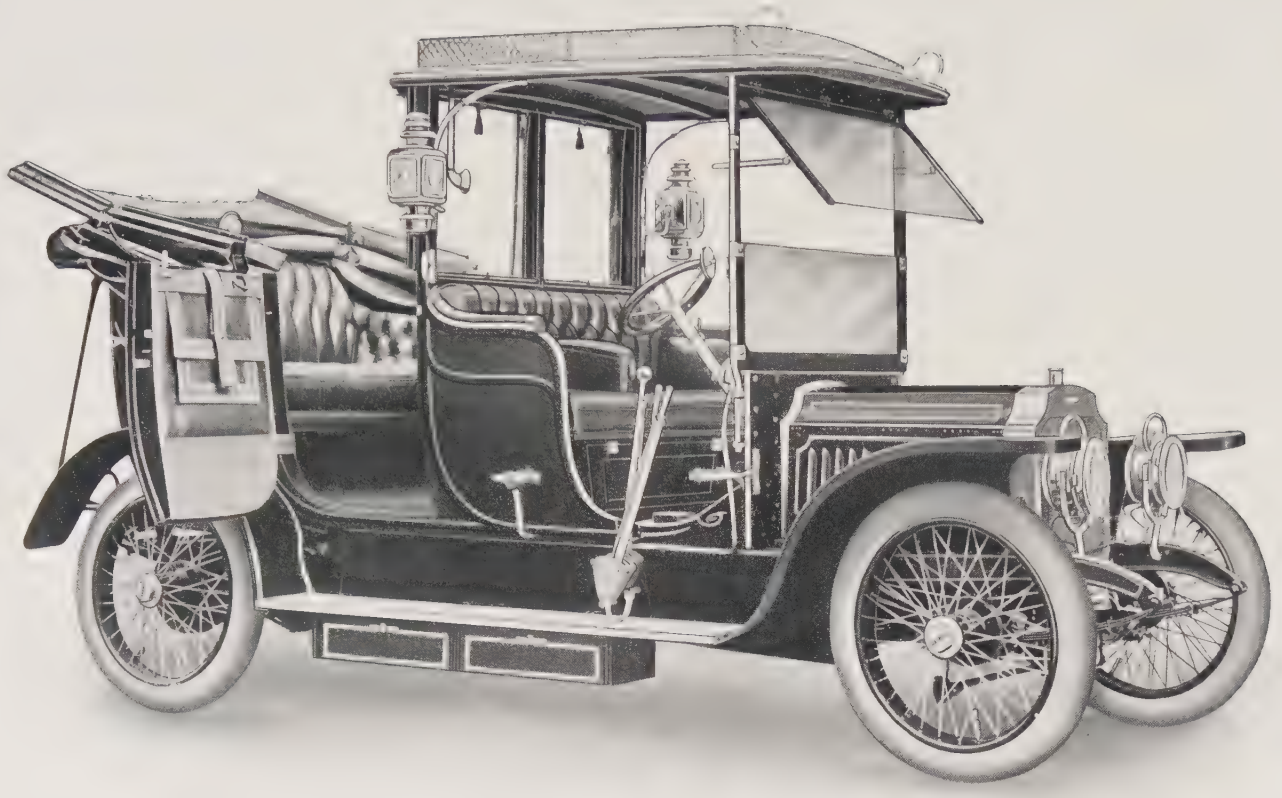

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A Catalogue Illustration.

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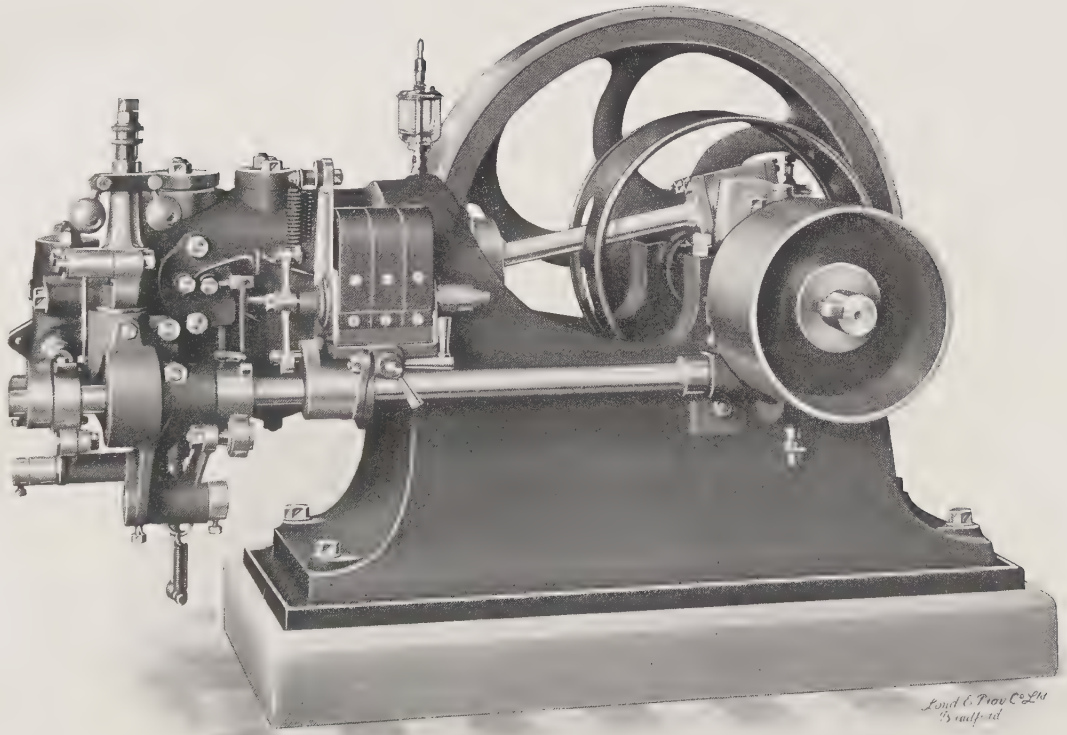
By kind permission of the Oliver Typewriter Co.

Illustration of new "D" Keyboard Composing Machine.

(By permission of the Lanston Monotype Corporation, Ltd.)



London & Provincial Reproduction Co., Ltd.

A Gas Engine Illustration.

Wallage & Gilbett, Ltd.

By kind permission of the Wolseley Tool & Motor Car Co., Ltd.

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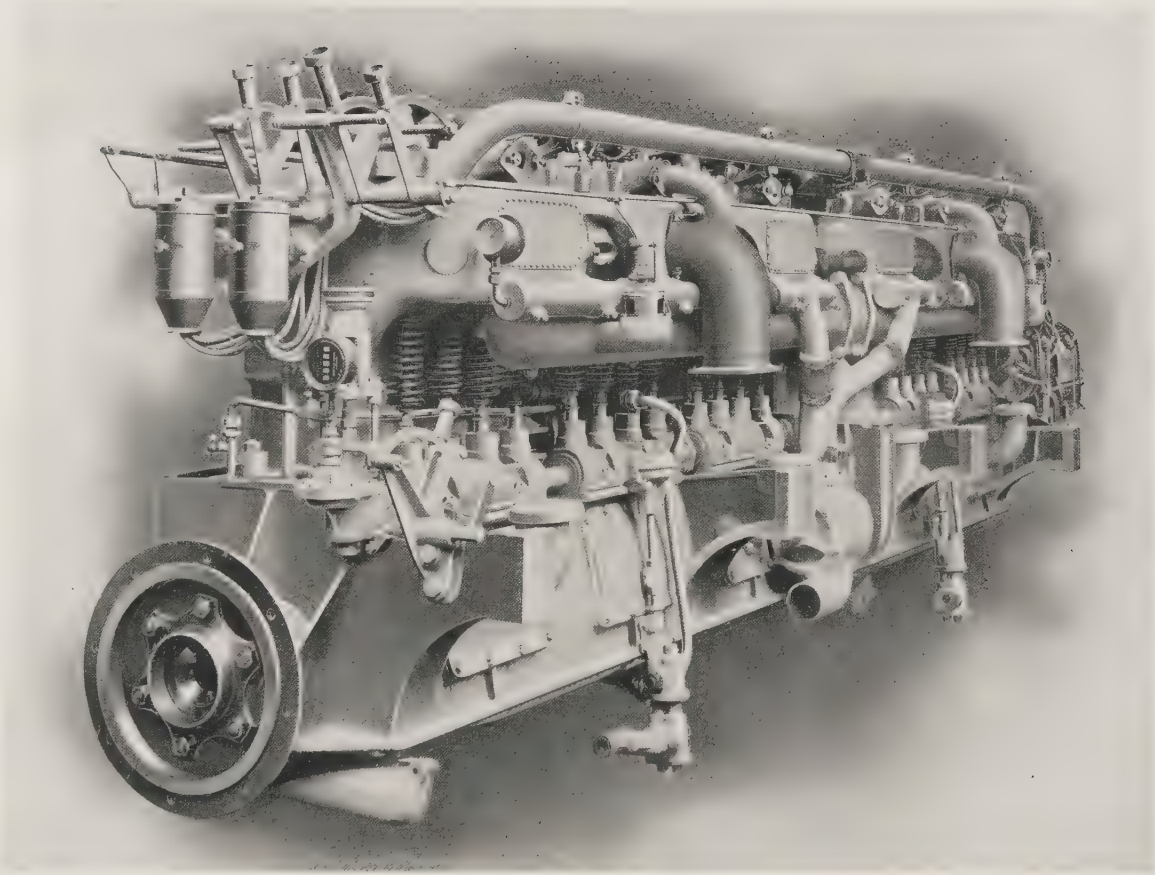


Wallage & Gilbett, Ltd.

By permission of the Wolseley Tool & Motor Car Co., Ltd.

A 400 h.p. Petrol Marine Engine.

Printed from the Original Block.

Autochromes and their Reproduction on Paper.

By HOWARD FARMER.

Principal of the Photographic School, Polytechnic Institute.

THE facility with which the colours of natural objects are reproduced on the Autochrome plate, and the general truth that likes will reproduce their own kind, leads to the supposition that it would be an easy matter to reproduce the colours of Autochromes, equally well on other Autochrome plates, or on paper, by means of any of the tri-colour processes.

In practice, however, directly attempts are made to use Autochromes as the originals for colour reproductions, baffling defects and irregularities arise, of which the following are examples :—

When sensitive plates, having suitable colour sensitiveness and selective colour action, but differing in manufacture or speed, are employed to obtain negatives from Autochromes their value as records for the purpose of reproduction may vary in every case.

When several portions, obtained by cutting one and the same plate, are employed to obtain negatives with the copying camera from an Autochrome, each time the adjustment for focussing is performed in the usual manner, or each time the scale of reproduction, or the lens, or the operator, or the Autochrome is changed, other conditions remaining constant, the value of the negatives as records may vary in every case.

The chief source of the trouble occurs in the fundamental nature of the Autochrome image, by virtue of which its three synthetical colours lie side by side, each one of them occupying a comparatively small portion of the total area of the plate. Consequently a photographic negative from either colour, also only occupies a portion of the negative plate, the intermingled portions, which theoretically should be quite transparent, representing the areas occupied by the other colours.

If the theoretical results were obtained in practice, the effect of these intermingled transparent spaces on the values of the gradations of the negatives would be to render the production of negatives from Autochromes an absurdity. But lens aberrations, and variations in the irradiation constant of sensitive films, which, owing to the minuteness of the areas in which they operate, pass unheeded in ordinary photographic work, give rise to an extensive spreading of the silver deposits, which therefore fill, more or less, the intermingled spaces.

The practicability of the reproduction of Autochromes is entirely dependent upon the ordered control of this spreading.

Further, to secure reliability in working, as well as a practical result, the problem resolves itself into the production of negatives, in which the light, acting through the starch grains of each synthetical colour, produces deposits, which either entirely coalesce with one another, or gradate in their spreading with the tones of the image.

The following are some devices for attaining these conditions which have been tested at The Polytechnic :—

1.—**By irradiation in the sensitive film.*

Very few photographers recognise the important and generally beneficial influence which irradiation exerts on their work. In the subject here under consideration, not only is irradiation of the utmost

importance in the formation of the Autochrome images themselves, but the measure of success, which has already been obtained in their reproduction, is largely due to its influence. Whatever other devices are utilized, a suitable irradiation effect with the sensitive films chosen will always be one of the first factors for consideration.

2.—†*By interposing an air space or transparent film or glass between the Autochrome film and the sensitive film, when producing negatives in the printing frame.*

3.—*An intentional diffusion of focal definition, when negative making in the copying camera.*

4.—*An intentional to-and-fro, or lateral, movement of the plate, lens or Autochrome, during exposure.*

5.—*Imparting a vibratory motion to the copying camera, or easel carrying the Autochrome.*

6.—*The use of a diffusing glass or lens.*

7.—*Placing a piece of finely ground glass in contact with the sensitive film or Autochrome.*

8.—*Interposing a thin plate of glass between the Autochrome and the image, and slightly oscillating the glass during exposure.* (I am indebted to Prof. W. Hibbert for the suggestion of this valuable method).

9.—*Placing a fine ruled screen in contact with the sensitive film.*

The mode of action of this device has already been published.

10.—*By a current of irregularly heated air passing in front of the lens.*

The first attempts to apply any of these devices will very likely produce results inferior to those obtained by leaving them alone, the inferiority being due, either to a partial but insufficient spreading, or to too much spreading, in which latter case the definition will suffer. Such inferior results can be diagnosed with the aid of a low-power microscope. When the Autochrome film is in focus, and the starch grains of one colour—the red for example—are examined, they are found in groups in which the individual red grains are closely approximated. Intermingled with these groups of red grains are areas of irregular shape, varying in size, but larger, frequently much larger, than the actual starch grains, and almost entirely free from those of this particular colour. It is the combination of the groups and comparatively bare areas, which produce the mottled effects, the variable nature of which is readily seen by the microscopic examination of the image when slightly out of focus. When the diffusion of focus is such that the images of the starch grains in groups coalesce with one another, but the diffusion is insufficient to fill in the spaces which are comparatively free from them, the mottled effect is very pronounced and much worse than when the film is sharply focussed.

The employment of these, or other devices, does not necessarily mean a loss of visual definition. The Autochrome itself does not show any appreciable loss of visual definition, due to its irregularly coloured starch grain texture. A patch of red, for example, appears to the unaided eye as a solid patch of colour, whereas in fact it is both grained and mottled. What we require is that the reproduction should represent, not the dissected anatomy of the Autochrome, but the visual effect when looking at it.

* *Phot. Soc. Journ.*, 1904, p. 257.

† The contact method of reproducing Autochromes from Autochromes with an adjusted source of light, and with the thickness of the glass between the two films, is an example of this method.

‡ "Irradiation in Photography." *Phot. Soc. Journ.*, 1904, p. 239.

Originals for Quick and Easy Reproduction.

By W. J. SMITH,

L.C.C. School of Photo-Engraving.

DECORATIVE INITIAL.

Design and Block by
L.C.C. SCHOOL OF PHOTO-ENGRAVING.

IN working for half-tone reproduction where high quality, coupled with speed, is aimed at the original must be full of bright detail and printed upon a suitable paper.

The photographer who has to photograph a scene or picture for process reproduction should obtain a negative that will give a good print upon a glossy bromide or gaslight paper, this paper being preferred to a P.O.P. print, the latter being liable to give double tones. Coloured originals, as oil or water-colour paintings, coloured pottery, silk, etc., require the texture and detail to be reproduced, and this can only be obtained by using a colour-sensitive collodion emulsion (which is most suitable for the purpose) or dry plate with a correctly selected filter. Over-correction is advisable sometimes, but too much over-correction is as bad as under-correction. Light washes of colour often reproduce better without a filter.

The operator should endeavour to understand and carry out his customer's wishes, as a thoughtfully reproduced result will save trouble in the after process and often repetition. Bromide prints can be made very quickly from a negative that has just been developed and fixed by washing the negative in running water for two minutes. While the washing is proceeding a sheet of bromide paper is well soaked in water until thoroughly limp, and then laid on the wet negative, blotting paper placed on top and a squeegee passed over to remove the excess of moisture or any air bells enclosed between paper and negative. These can be seen by inspecting the glass side of the negative, which must be perfectly clean. If the negative is supplied by the customer and it is flat and the process man does not wish to doctor it, there are two ways to obtain a bright print. The first is to make a print upon bromide paper and develop with a strong hydroquinone developer, such as is used for black and white work, the print being fully exposed so that the lower tones are well developed and the high-lights tinted. The whole print can be brightened up by a careful application of the iodo-cyanide reducer. The Howard Farmer reducer is not recommended on account of its liability to stain the whites yellow, which is fatal for quick reproduction. To use the reducer lay the print upon a sheet of glass and apply the reducer (which must be strong) with a pad of cotton wool, pass quickly over the print and, when the lights are brightened sufficiently, the reducer may be applied locally where necessary. Wash the print frequently under water, otherwise the reducer cannot be controlled. It is not advisable to place the print into the solution, as it is likely to reduce in a mottled manner.

A bright negative can be obtained from a flat one by making a transparency upon a process plate, which should be well exposed; this can be carefully reduced locally and intensified if necessary, and a negative made by contact which will be a great improvement on the original one as far as reproduction purposes are concerned. The usual way is to have the print worked up by an artist who specializes in this class of work. Many originals would give comparatively no trouble if they had a few effective touches put on them and generally this work could be easily removed with the aid of a wet sponge before returning the original to the customer. This work should be particularly easy for the fine etcher.

A good fine etcher will recover lost detail, strengthen weak portions and produce a block that gives a print which is a great improvement upon the original. By the aid of a brush and a few colours this could be done much more quickly upon the original, as this entails only one operation, whereas the fine etcher has two or three to perform, *viz.*, stopping in weak or missing detail, then etching and often having to repeat the operation. With originals that have been skilfully worked up and a good screen negative made from same, and this screen negative printed on the metal correctly, there is no reason for the plate to require any fine etching. Whites that are inclined to hold back can be hurried up by carefully brushing with the etching brush. As said before, the artist must know exactly how the colours he uses will reproduce, and therefore should be specially trained. It would be exceedingly helpful if this training included a course of operating in the photographic studio; he would then be able to work more in harmony with the operator who has to reproduce his work.

Wash drawings prepared for reproduction should be made on the warm side, blue-tinted washes reproduce in a much lighter tone than they appear to the eye, this necessitates a lot of reduction when finishing the negative.

Working up is best carried out in daylight; electric glow lamps give a yellow light, therefore all blue colours look much darker than they really are. Air-brush work should be sprayed on as evenly as possible, any grittiness will be intensified in the etching and spoil the smoothness that is characteristic of a good half-tone block.

Line work that is intended for quick reproduction must be drawn on a smooth white paper or board, the drawing being carried out with a good process black. Such a process black is one that dries with an intense dead black surface. All fine lines must be as black as the coarse ones.

The artistic quality of an original is easily spoilt in the reproduction when the artist has drawn weak fine lines. These weak lines reproduce on the negative with a tint. This tint the operator has to remove by reduction which may coarsen the thick lines and the quality of the original is lost. The amount of reduction must be considered, because an original with close fine lines will not look well if they are much reduced, as the fine lines are likely to merge into one another and reproduce as a solid black patch. A blue-tinted tracing paper is to be preferred to a yellow-tinted one.

Given an original of suitable quality for reproduction, it will be the process engraver's fault if he does not turn out a perfectly smooth, clean-printing block in the minimum of time which will give satisfaction to his customers and secure some margin of profit for himself.

Entwistle, Thorpe & Co.

Negative on "Graphic" Process Plate.

Catalogue Illustration.

The Graph Process of Photo-Copying.

By R. B. FISHENDEN, School of Technology, Manchester.

AMONGST the more recently introduced processes for the making of photo-copies of plans and engineers' drawings there is one which possesses considerable technical interest. This process has been introduced under various names, but the one given at the head of this article probably is the most suitable.

In brief, the method consists in the making of an ordinary ferro-prussiate print and transferring it directly without developing, to a prepared and moist gelatine surface. On the application of a suitable ink roller, the lines "take" the ink and a proof may be obtained by merely laying down on the gelatine surface a piece of ordinary drawing paper or tracing cloth. As will be seen, the process is extremely simple in operation and has the following advantages.

(1) The copies are exactly true to scale with the original drawing.

(2) The process is economical.

(3) The copies are in a lithographic ink.

(4) No press is required for printing, so that large sizes are more readily undertaken than when the "Vandyke" process is used, in which a lithographic press is a necessity.

The principles upon which the process depend are well understood, and it may not be out of place to give an outline of them. In 1842, Sir J. F. W. Herschel* published a valuable paper dealing with the sensitiveness to light of certain salts of iron. The iron compounds may exist corresponding to two states of oxidation, the ferric and the ferrous states, and it is found that the more highly oxidized compounds (the ferric salts) become reduced to the ferrous state under certain conditions on being exposed to light. In addition, ferric salts have the property of insolubilizing gelatoids, albumens and gums, whilst the ferrous salts are inactive. Also, it is interesting to note that if gelatine, insolubilized with a ferric salt be exposed to light, the gelatine regains its solubility. These principles are utilized in various photographic processes in different ways, and there is no doubt that there is considerable scope for their utilization in photo-mechanical work.

Ferro-prussiate paper, which is used in the "graph" process, is prepared by coating paper with an organic salt of iron—ferric ammonium citrate, mixed

* On the Action of the Rays of the Solar Spectrum and on some New Photographic Processes, June 16th, 1842, J. F. W. Herschel, Phil. Trans., 1842, p. 181.

with potassium ferricyanide ; after the exposure, the print is developed in water, the changed or reduced ferrous salt producing with the potassium ferricyanide a blue deposit, the name of which is Turnbull's blue. There is no need for the presence of the potassium ferricyanide in the working of the " graph " process, but its presence is not harmful, and ferro-prussiate paper is a commercial article. The production of the printing surface depends on the fact that after exposure of the paper under a tracing, the protected portions under the lines, consist of a ferric salt, whilst the clear parts which have been exposed will have been changed to the ferrous state. When the paper is laid on the moist gelatine surface, the salts diffuse into the gelatine, producing insolubility in the portions corresponding to the lines of the tracing. The gelatine will be selective as to its capacity for receiving or repelling a greasy ink after the manner of a lithographic stone, a photo-litho transfer, or a collotype plate.

In actual practice, old or creased tracings should be avoided, if possible, because it is difficult to avoid markings in the prints which are produced in this way, the creases making black marks. The ferro-prussiate paper should be quite fresh and of a good quality—a soft paper will sometimes cause difficulty in transferring to the gelatine. A full exposure must be given in order that the ground work may be completely converted to the ferrous state ; if the print is under-exposed, the ground will be dirty in the prints.

The gelatine solution may be coated on zinc plates or on plate glass for the making of the printing surface. The composition of the gelatine preparation is of great importance to the satisfactory working of the process, and several preparations are on the market for the purpose.* A solution may be prepared as follows :—

Glue or gelatine	40-50 parts.
Phenol (carbolic acid)	2 parts.
Glycerine	4 parts.
Water.....	100 parts.

To this solution is added sufficient of a ferrous salt† (ferrous sulphate may be uesd) to produce a good printing image when rolling up. The gelatine solution is heated, poured over the plate and then allowed to set. In this condition the plates may be stored until required, the carbolic acid preventing the gelatine decomposing, and the glycerine keeping the jelly moist during printing by reason of its hygroscopic properties. Should the ferrous salt become oxidized, the gelatine will roll up black, excepting where the exposed portions of the print are placed in contact with it, the ferrous salt being sufficient to remove the insolubilization caused by the presence of the ferric compound.

After exposure, the print is transferred to the gelatine surface without wetting, and rubbed into contact, and is allowed to remain for at least one minute ; if left too long, the surface of the paper will stick to the gelatine, thereby spoiling the work. The paper being removed it will be noticed that the lines of the subject are sunk slightly below the general level of the surface of the gelatine, this being the effect of the insolubilization.

Either a lithographic nap roller or a gelatine composition one may be used for the inking in of the gelatine. A soft lithographic ink, rich in pigment and "reduced" with a "long" varnish may be used, for without the varnish scummy prints will be produced. A fairly brisk rolling up with moderate pressure will be found to yield the best results. After the inking, any portions which are not

* All materials for this process can be obtained from Penrose & Co.—Ed. *P.Y.B.*

† Ferrous-ammonium sulphate, which is a more stable compound, may be substituted.

required are covered with thin paper, and then the paper for the proof is laid on the gelatine and rubbed on the back. On removal, the ink will be found transferred to the paper. Tracing cloth or a good drawing paper or other hard sized paper may be used for the proofs.

In skilful hands as many as ten copies may be taken from one gelatine surface, which is a larger number than is usually required. After use the jelly is scraped off and remelted for further use. The process should be worked in a cool workshop, or difficulties will be encountered in the hot weather, owing to the softening of the jelly. The addition of a small amount of tannin or chrome alum to the gelatine solution will be found to obviate this to some extent, but if too much of the hardening agent is used, the prints will not roll up with a clean background ; in extreme cases, the plates may be worked over a bath containing a freezing mixture in the hot weather.

The process which has been described is one of considerable practical value, but it is recommended that anyone taking up the method for the first time, should purchase a batch of the gelatine preparation and suitable ink for use with it, before attempting to adjust the conditions for themselves.

Litho-Zinc and Metal Plate Printing.

By G. H. BLOCK.

FOR a great many years I have advocated the printing from litho metal plates. My experience and experiments extending over thirty years on all sorts of metals as a practical lithographer, has led me to always favour zinc. In 1884 I started as practical manager to the first firm supplying patent litho-zinc plates (Messrs. C. & E. Layton). Since then I have sold licences for my process to various Government Offices in England and abroad. To secure protection for my methods I have taken out a great number of patents since 1887. Naturally, when any good process is offered to the public, the infringer and imitator soon starts operations, but I have continued to improve my methods to meet such competition, and challenge any other maker to beat my litho-zinc and aluminium plates

I am pleased to say the old prejudice against zinc printing has worn off, and the cry for aluminium plates has subsided. Some years ago I predicted at a trade meeting at a well-known institute, that in time zinc would take the first place in planographic printing. The proof of this is to be found in the fact that zinc plates are now being sold by some firms who previously condemned zinc and sold only aluminium plates.

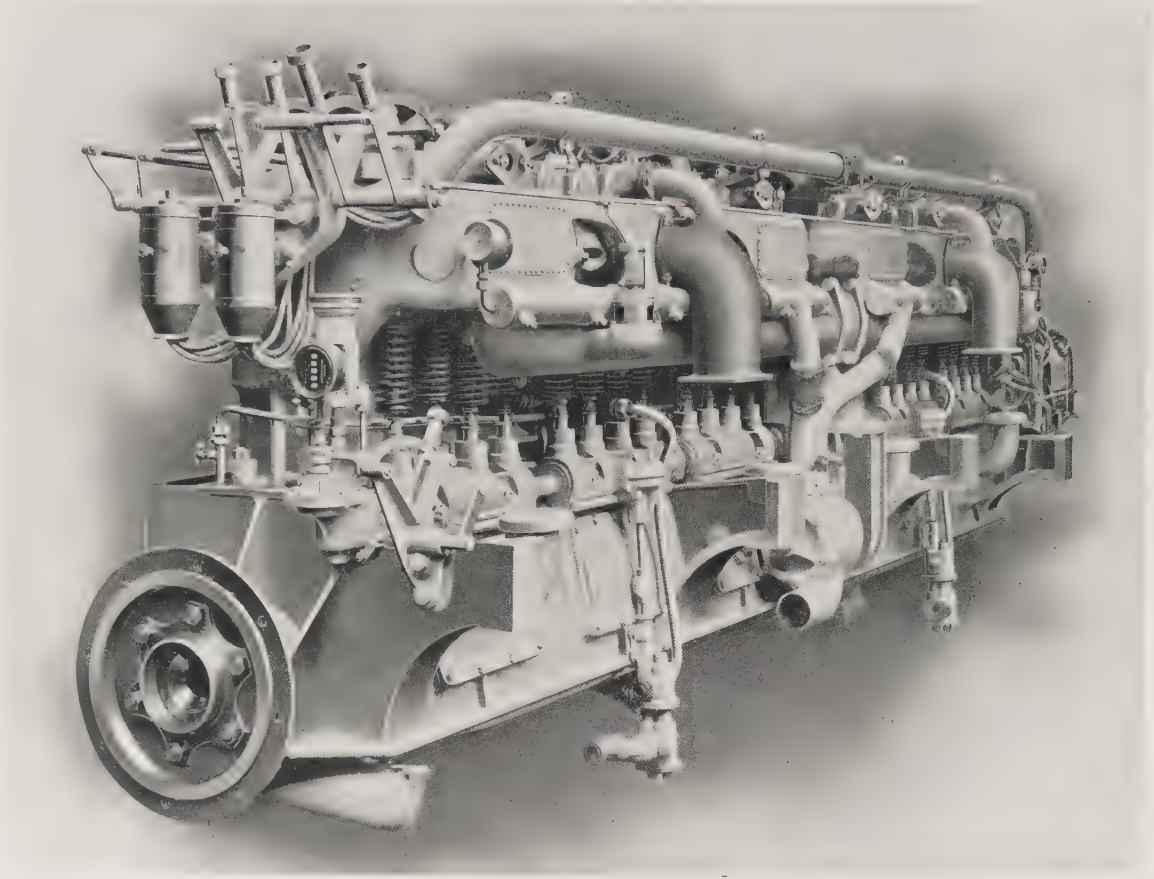
The work from zinc plates on the rotaries and offset machines of Messrs. George Mann & Co. will stand comparison with anything printed from litho stone, or direct copperplate printing, even on the roughest paper.

Further, I may state that I have had very good results of photo-litho work in half-tone for colour work direct on my litho-zinc plates, by the "Redcol" process, and directions for use in this way will soon be published by Messrs. A. W. Penrose & Co.

THE PICTURE BOOK.

PAWSON & BRAILSFORD.

Photograph by
E. E. HINDLEY.



Eyre & Spottiswoode, Ltd.

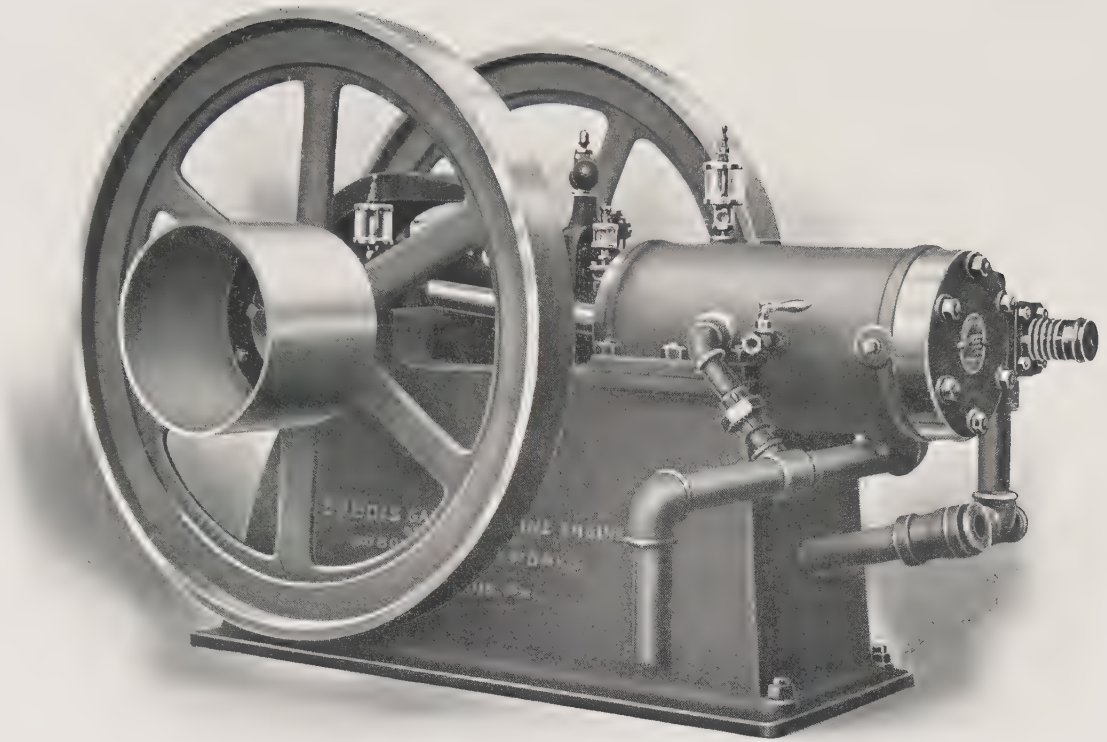
By permission of the Wolseley Tool & Motor Car Co., Ltd.

A 400 h.p. Petrol Marine Engine.

Printed from an Albert Galvano.

W. & G. Baird, Ltd.

Cut Glass Ware.



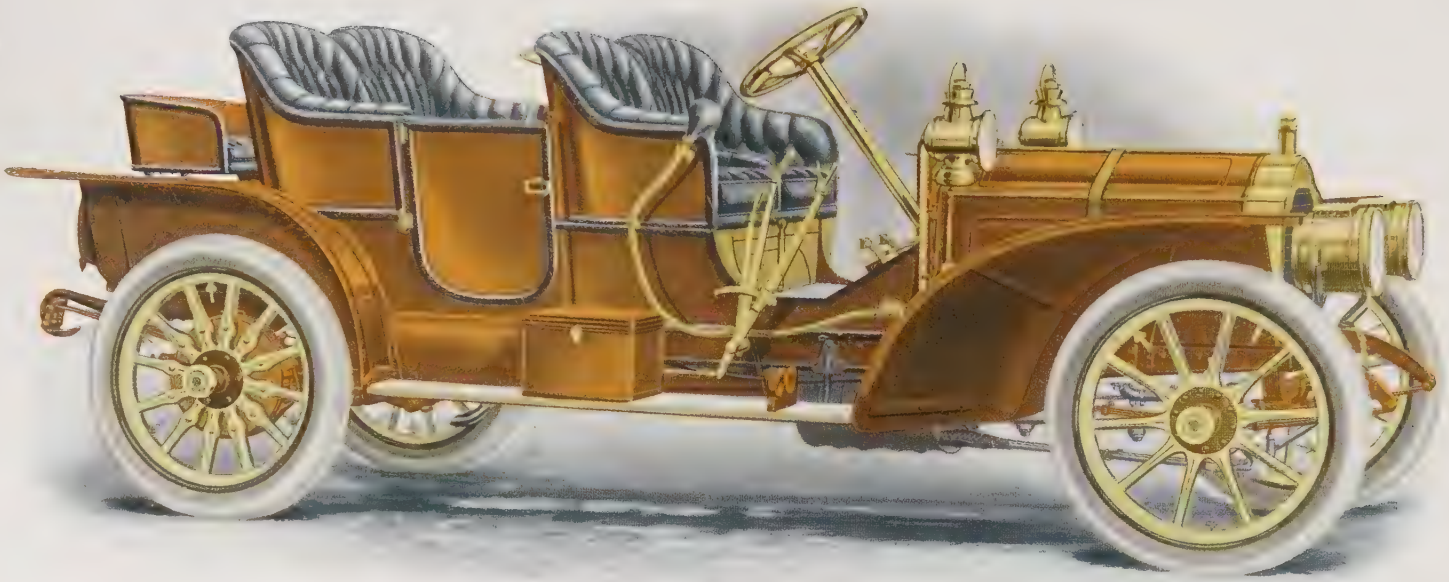
Electric City Engraving Co.

A Catalogue Illustration.

Wallage & Gilbett, Ltd.

By permission of the Yost Typewriter Co., Ltd.

A Catalogue Illustration.



A Motor Car Illustration

Pictured Mathematics.

By N. S. AMSTUTZ, Valparaiso, Ind.

On The Alert.

Geo. Newnes Ltd., Process Studios. Photograph by W. T. Green.

PERHAPS the reader will wonder whatever such a subject can have to do with graphic art matters, and his wonderment will be entirely excusable, for as the art has advanced hitherto there has been an absence of mathematical consideration of some of the most vital of the underlying principles. In view of this fact it is not strange that the "rule of thumb" has been almost universally applied.

The matter presented in this article is not intended for the expert mathematician but for the hundreds of persons to whom mathematical processes are more involved than the proverbial Greek.

As the graphic arts and crafts move on to greater and greater developments it becomes more and more necessary to use simple mathematical formulas in order to secure the advantage of definite procedure in the execution of complex problems.

Whatever one may have learned in the schools about the various arithmetic factors there is, nevertheless, a wide-spread failure to grasp the underlying relation of such factors as squares, cubes, square roots, cube roots, reciprocals, diameters to circumferences and areas of circles, sides of squares to diagonals; the relation of changes that occur in the dimensions of right-angled triangles when the angles are varied—how rapidly the different dimensions become larger or grow smaller.

The readers of the "Process Year Book" are not novices in the use of graphic curves, in fact the various well-known curves of Mr. J. A. C. Branfill, as to area dimensions of blocks, etc., and the cost charts of Mr. George H. Benedict, of Chicago, are practical exemplifications of the value of this form of presentation.

It is well known that in every phase of the illustrative arts there are made improvements of one kind or another, optical, chemical, electrical and mechanical in order to save time and secure greater uniformity in results, but of helps in the direction of enabling one to form fairly accurate prognostications as to the rate of change of numerical values there are but few that are available for the busy man who is not blessed with a natural mathematical bent. The use of graphic curves is fortunately growing and it is no longer necessary for the worker or proprietor to depend on others for information that he can himself secure from graphic curve charts without the use of a lot of mental gymnastics and the employment of abstruse processes.

The curves that accompany this article are not intended to disclose the *exact* relation of all the values that they illustrate, but to show the broad relation that

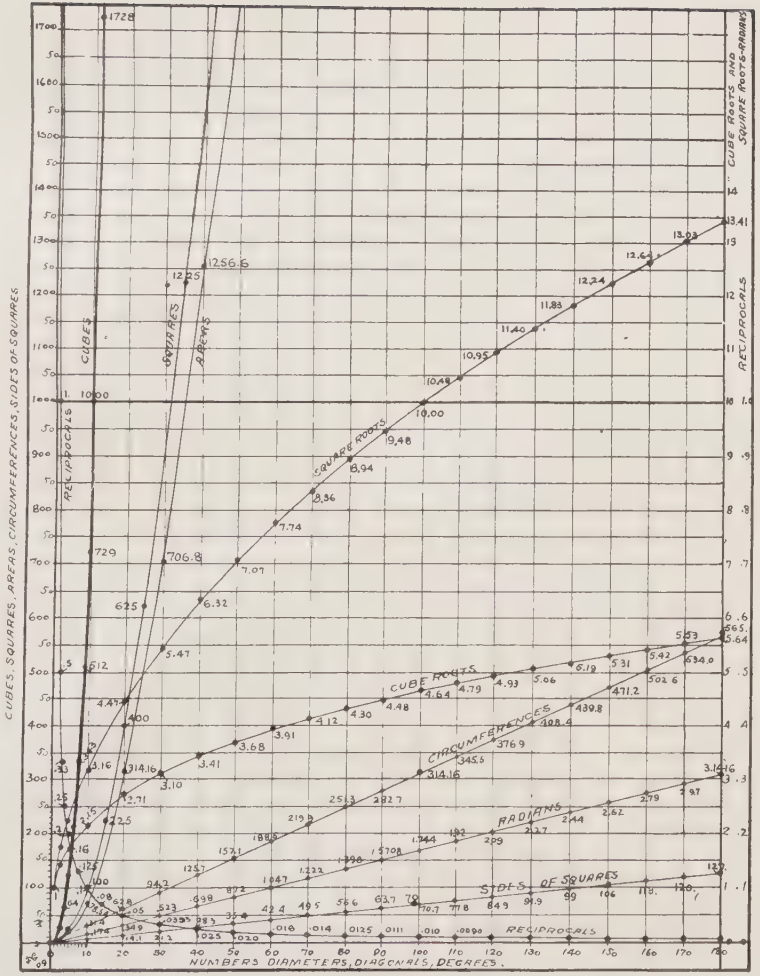

CUBES, SQUARES, AREAS, CIRCUMFERENCES, SIDES OF SQUARES
CUBE ROOTS AND SQUARE ROOTS-RADIANS
RECIPROCALS
CUBES
SQUARES
AREAS
SQUARE ROOTS
CUBE ROOTS
CIRCUMFERENCES
RADIANS
SIDES OF SQUARES
NUMBERS DIAMETERS, DIAGONALS, DEGREES.

Fig. 1.

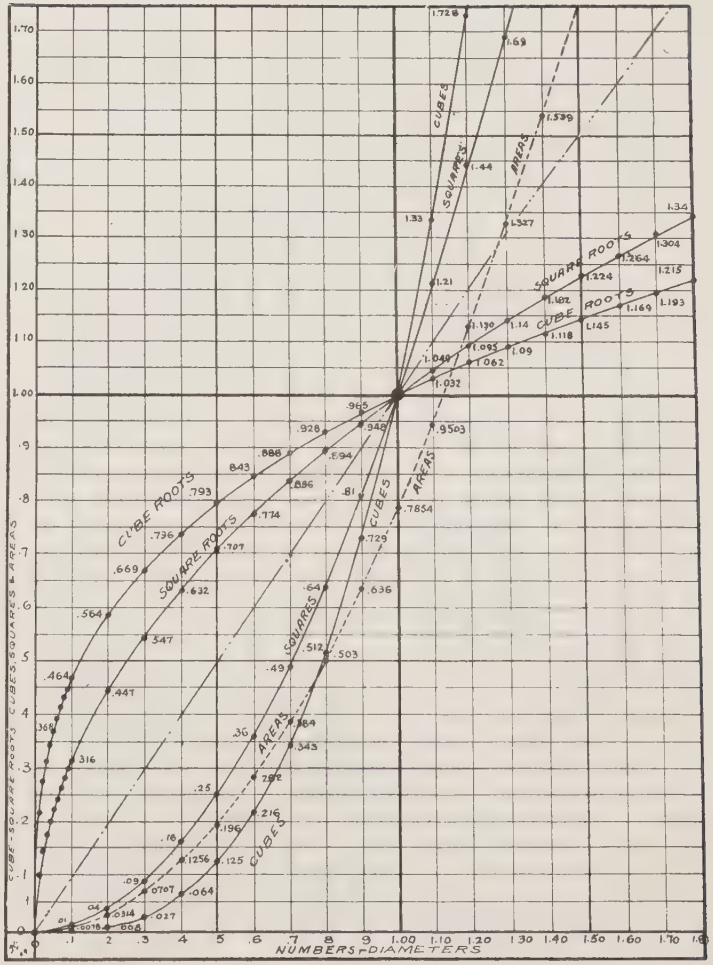

CUBE-SQUARE ROOTS, CUBES, SQUARES & AREAS
CUBES
SQUARES
AREAS
SQUARE ROOTS
CUBE ROOTS
NUMBERS-DIAMETERS

Fig. 2.

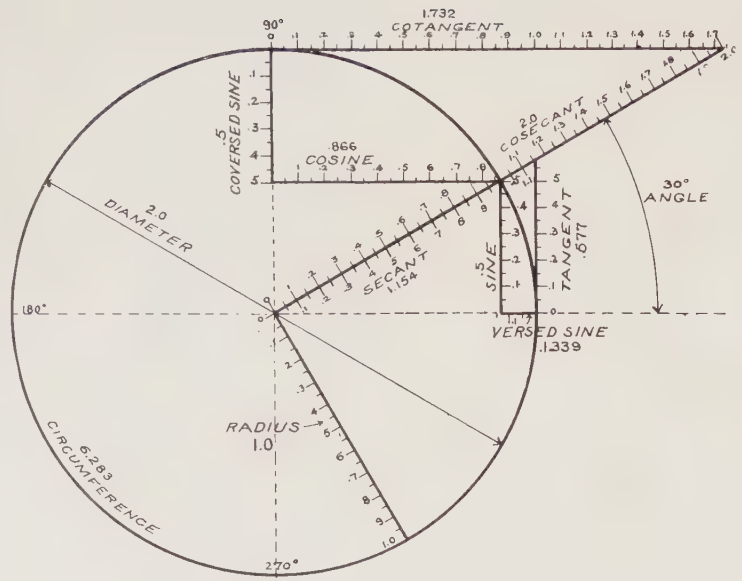

90°
1.732
COTANGENT
.5
COVERSED SINE
.866
COSINE
2.0
COSECANT
30°
ANGLE
2.0
DIAMETER
SECANT
1.154
.5
SINE
.577
TANGENT
180°
VERSED SINE
.1339
RADIUS
1.0
6.283
CIRCUMFERENCE
270°

Fig. 3.

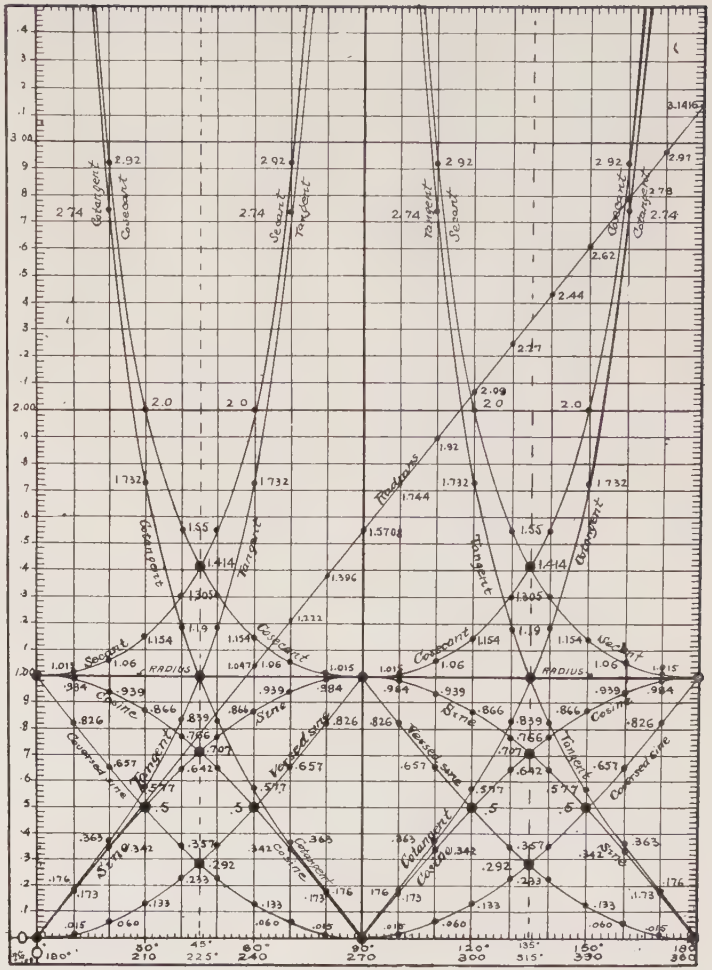

Cotangent
Cosecant
Secant
Tangent
Radians
Versed sine
Coversed sine
Sine
Cosine
RADIUS
180°
90°
270°
360°

Fig. 4.

they bear to each other, so that one can immediately note the *rate of change* of each separate value and the *trend* of the variations that exist between them, and in this way lay the basis for the exercise of an intelligent judgment.

Fig. 1 illustrates the relation of cubes, squares of numbers, areas of circles, circumferences of circles, radians of angles and sides of squares to diagonals to the same related scale. The square and cube roots and reciprocals are shown to a separate scale found on the right-hand edge of the diagram.

Fig. 2 shows the values of cubes, squares, cube and square roots and areas of circles in the vicinity of and below unity.

Fig. 3 is a diagram showing angular and circular functions and their technical names along with the relation that they bear to unity—the radius—whether larger or smaller, and how much.

Fig. 4 shows how all the values relating to circles change from " 0 " to 360 degrees when the radius remains uniform, but the angles vary. The technical names used will be more easily understood by referring to Fig. 3, wherein they are shown to scale.

In Fig. 4 no attempt is made to show positive and negative values because it is enough for the person who is not a mathematician to see what the values of the different dimensions shown in Fig. 3 are for degrees varying from " 0 " to 360. It will be noticed how the values from " 0 " to 180 degrees are duplicated by those from 180 to 360 degrees. The large black circles show the points where several values are the same, either in degrees or parts of the radius, which is shown by the straight horizontal line " 1·00." The exact values are marked on the diagram for the four quadrants (0 to 90 ; 90 to 180 ; 180 to 270, and 270 to 360) of the circle in ten-degree steps, except at the half-quadrant points (45 and 225, 135 and 315 degrees) in five-degree steps. These show how much larger or smaller than the radius the given dimensions are. Whenever the radius is changed the values all change accordingly. If the radius is doubled they are all double the value shown, and if the radius is but one-half of that marked on the diagram then the values are all one-half of the value given.

In order that the memory will have something besides figures on which to depend for the localizing of the relation of these dimensions, through the peculiarity of the various curves, it may not be amiss to call attention to the two " X " shaped figures that are formed on Fig. 4, with their centres at 0·5 and 45 and 135 degrees.

If any other values than those specifically marked are desired within the range of the diagrams, any point selected on a curve followed to the scales at the edges will, by estimation, show the values desired.

Loading the Net.

Manchester Wood Engraving Co., Ltd.

Photograph by F. N. Tipton.

Globe Engraving and Electrotyping Co.

200 line Half-Tone from which Electros on following pages were taken.

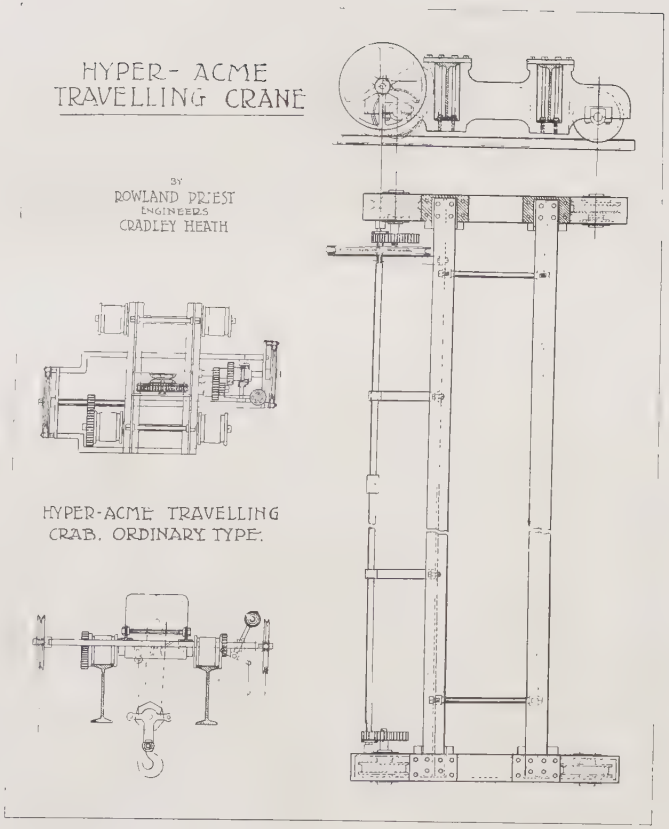
An American Park.

Globe Engraving and Electrotyping Co.

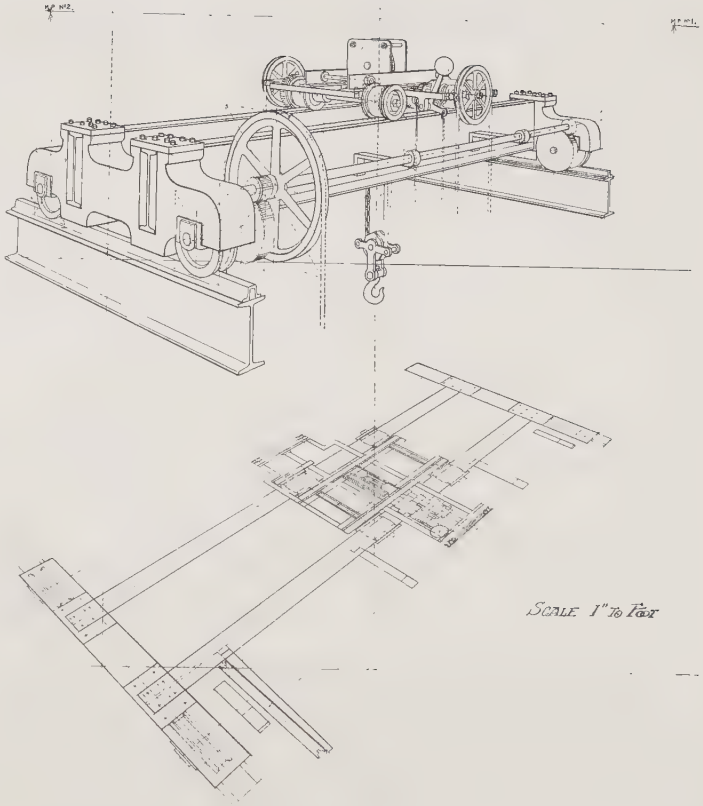
Electro from Half-tone on preceding page demonstrating new process of Liquid Blackleading.

Globe Engraving and Electrotyping Co.

Electro from Electro on preceding page demonstrating new process of Liquid Blackleading.



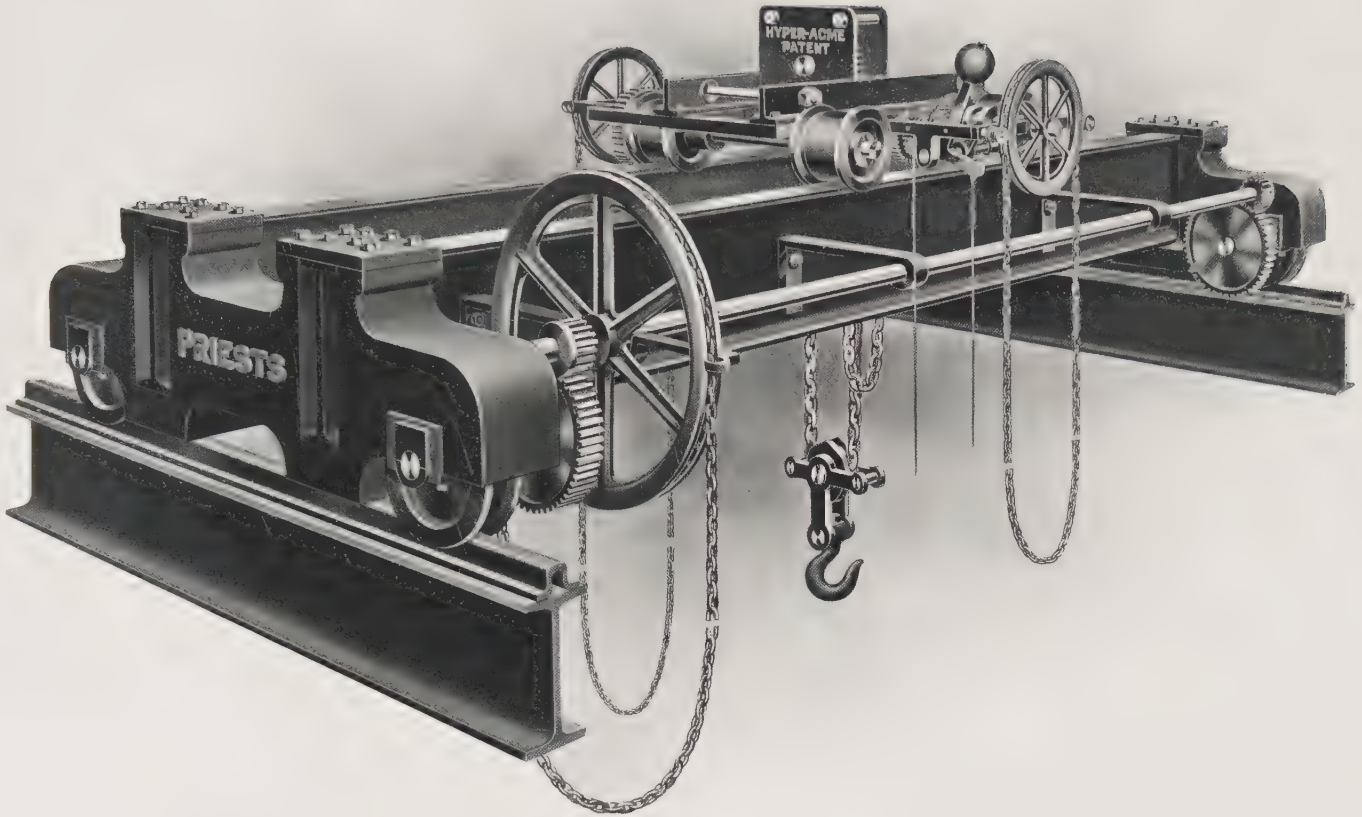
Reduced Facsimile of Blue Print supplied.



Showing Perspective Problem in Progress.

Illustrating the method of Producing Perspective View from ANY point to ANY Scale when working drawings only are obtainable.

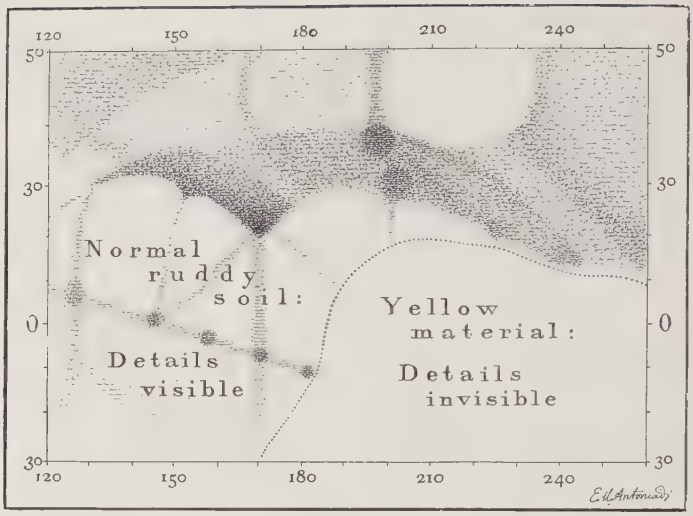
The "Tone" Photo-Engraving Co.

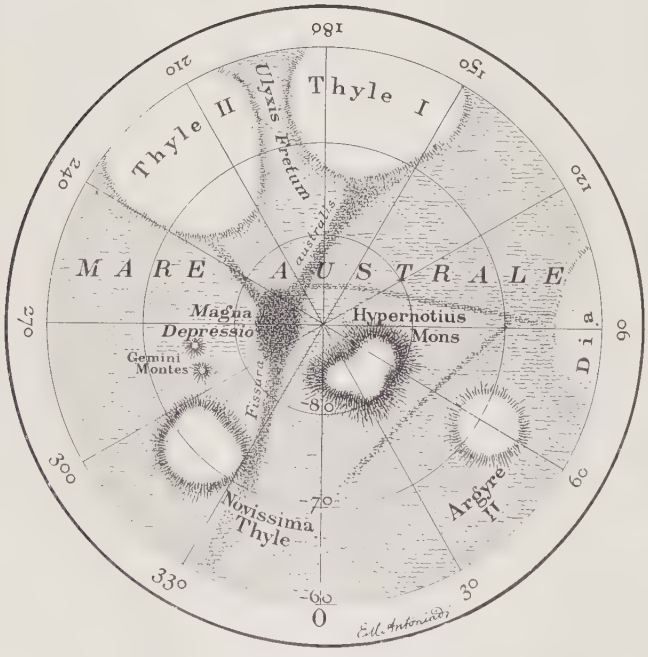


The "Tone" Photo-Engraving Co.

By permission of Messrs Rowland Priest.

Reproduction from Completed Wash Drawing, showing the result obtained.



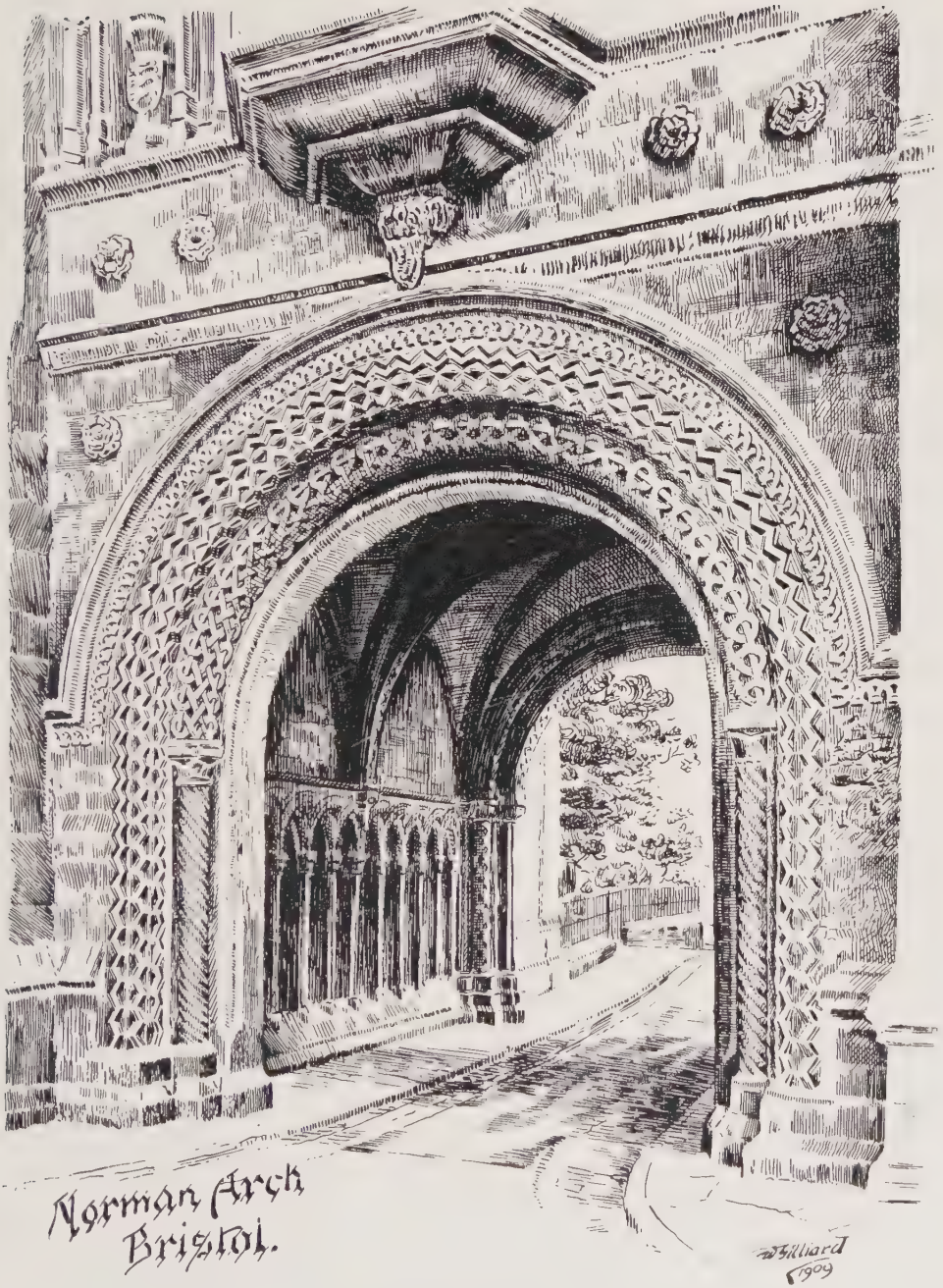


Mars.

Facsimile Reproduction of Drawings by Mr. E. M. Antoniadi.

Etched on the Levy Acid Blast by Geo. Newnes, Ltd.

Reproduced from the "Journal of the British Astronomical Association" by permission of the Council.

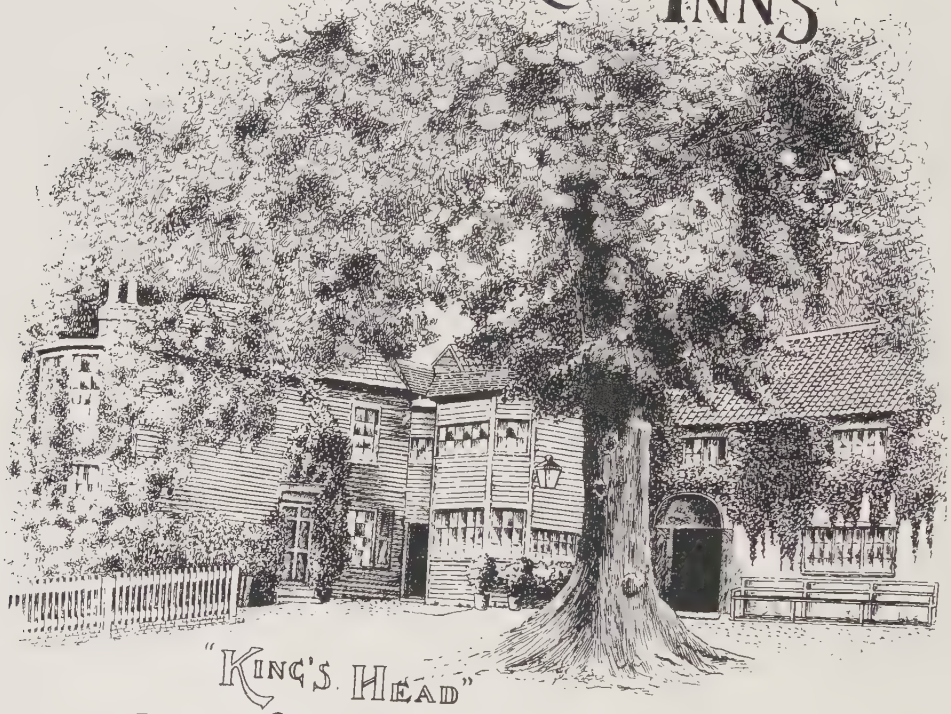


Etched by the Northern Art Reproduction Co., Liverpool.
Photograph by A. G. McKinlay,
"Liverpool Daily Post" Office.

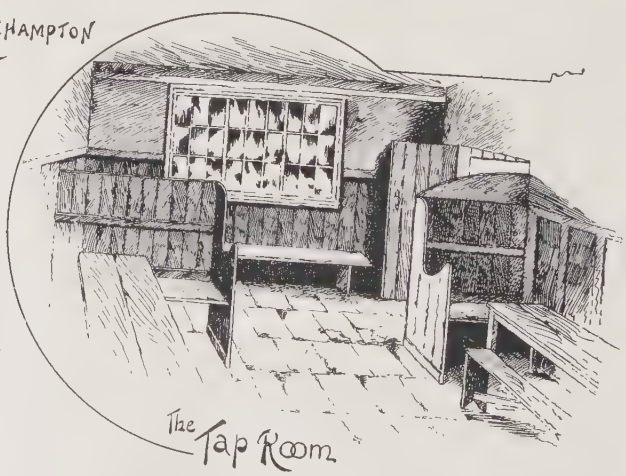
Line block on Zinc from paper transfer by Amphitype Process.

Transferred to zinc by H. Shawcross.

OLD ENGLISH INNS



"KING'S HEAD"
ROEHAMPTON



The Tap Room

Etched by the Northern Art Reproduction Co., Liverpool.
Photograph by A. G. McKinlay,
"Liverpool Daily Post" Office.

Line block on Zinc from paper transfer by Amphitype Process.

Transferred to zinc by H. Shawcross.

The Amphitype Process.

By HENRY L. SHAWCROSS, B.Eng.

Decorative Initial.

Design and Block by the
L.C.C. School of Photo-Engraving
and Lithography.

IT may seem like the exaggeration of an advertisement to state that with the introduction of this process a New Era has begun for the lithographer, yet if the advantages which are afforded him by its use are considered it can hardly be said that we are claiming too much. He is provided with a ready-sensitized photo-lithographic transfer paper, and a ready-prepared fluid litho. transfer ink for immediate use therewith, the expert handling of which is a simple matter to acquire, and which is ever ready to his hand available for use. These afford him facilities in applying the photographic arts and processes to his craft in a simple and efficacious manner that he has not hitherto enjoyed. Until the introduction of this process, it was necessary for the transfer worker to sensitize beforehand all the paper he would be likely to require. This involved not only much foresight, but delicate, troublesome and sloppy operations. Only experts could succeed in producing a satisfactory paper; moreover, when prepared it would not remain photographically good or fit for use for more than a few days. To prepare the paper himself was completely outside the range of the ordinary litho. worker's operations. It involved for him disappointing failures with loss of time and material, and probable delay on the production of work. Where only an occasional photo. transfer was required, the expense and trouble of preparing the paper rendered it not worth doing, and consequently photo.-lithography was generally left in the hands of a very few professional workers.

All this is now changed with the use of the ready-sensitized Amphitype photo.-litho. transfer paper. All preliminary operations have been eliminated, and the lithographer or process printer has at his disposal a simple and ready means of obtaining impressions on the surface of stone or metal of any subject that can be photographed. This Amphitype paper in its ready-sensitized state presents the very great advantage that it will keep good for an indefinite time before use, and may therefore be stocked ready to hand, so as to be available for any job that may crop up. But little experience is required to become an expert in its use. It is easier than ordinary amateur photography, and with very slight practice high-class photo.-transfer prints can be produced with the greatest facility and certainty. Where there is no photographic apparatus on the premises the process can easily be worked. Any process photographer will supply the negative to the size required. Where there is no process house near

it is no very difficult matter for any ordinary photographer to get into the way of making a suitable line negative, or even half-tone negative if need be. The rest of the work is best done by the lithographer himself.

The actual production of the transfer, once the negative is obtained, requires practically no expensive apparatus, the only article required being a photographer's ordinary printing frame. It will make matters more certain if, in addition to this, one has an actinometer. Beyond this, and a couple of dishes for development, together with a little ink, and cotton wool—the whole outfit costing but a few shillings—all the means are at hand for producing photo.-lithographic transfers equally as good as those hitherto produced by the professional photo.-lithographer under much more elaborate conditions.

By a recent improvement in the method of working it is found very advantageous to apply the ink in a liquid form by means of a tuft of cotton wool, and the print is developed by means of one simple chemical bath followed by a little gentle rubbing with clean cotton wool and water, leaving the print in sharp transfer ink lines on a blue ground. After the print is dried there seems to be no limit to the time it will keep good. Such transfer prints have gone down to stone or metal when one year old equally as well as fresh ones. They may be safely transmitted to any part of the world by post.

An important point in connection with this process is that no bichromate or any other poisonous material whatever enters into the composition of the paper, and therefore the operator is quite immune from the considerable risk he underwent in the old process of contracting bichromate poisoning.

There can be no doubt that this process greatly enlarges the scope of the lithographer's work, and vastly extends the field of his operations. Not only is line work greatly facilitated, but half-tone printing, of which the screen and process plate largely deprived him a generation ago, is again brought well within the sphere of his daily labours. The screened negative is rendered as useful to the stone worker as hitherto it has been to the process worker. Amphitype transfers direct from half-tone negatives will go down to stone or metal with a precision that is marvellous, each dot being as sharp and distinct as if obtained by direct photo.-printing. Anything that will photograph can be transferred to stone or metal with a simplicity of means that is surprising. To the colour worker it opens an immense field of possibilities from the facilities it affords of selecting any part of the grained negative, or of the transfer print itself for any tint required by blocking out the remainder. It also offers great opportunities for duplicating, so as to work a number of small sizes on one plate. The writer has reason to believe from experiments which are now being made that it will be eventually found possible to impress the screen grain on to the paper in the course of printing through a continuous tone negative placed in the printing frame in conjunction with either a metzograph, or a cross line screen. This will dispense with much expensive photographic apparatus, and lead to a much-desired simplification in direct process lithography by the elimination of intermediate camera processes.

A New Colour Process, and its Possibilities.

Design and Block by the L.C.C. School of Photo-Engraving.

WE are enabled to give our readers the first account of a new and very simple process for the production of patterns and designs in colour, which, when sufficiently developed, promises to become one of considerable importance in various industries.

We all know that when a surface is covered with regular recurrent series of lines or dots in suitably selected hues of red, green and violet, of sufficient fineness as not to be individually distinguishable, the colours fuse together and produce white, or rather grey, as it is upon these principles that all the latter-day methods of screen-plate photography—Autochrome, Thames and Omnicolore—are based. The black image on the sensitive film, in contact with the colour-screen, blocks out that portion of the colours which is not wanted, and the fusion of the remainder produces the colour image in all its tones and shades. Whilst, however, all attention has been fixed on the adaptation of these principles to colour photography, it has been left to Mr. Julius Rheinberg, F.R.M.S., of 32, Snow Hill, E.C., to apply them in quite a different direction, towards the attainment by the simplest means, and without the application of photography at all, of an infinite variety of coloured patterns and designs for commercial purposes.

In Mr. Rheinberg's process the surface of the paper is initially provided with, for instance, red, green and violet colour lines in regular sequence, producing when viewed at a suitable distance a neutral grey tint. The number of lines depends on the purpose for which the paper is intended. If for a book, or anything viewed close at hand, fifty series or 150 colour lines per inch will produce optical fusion. For a poster intended to be viewed at a distance as few as five series might suffice.

One single impression now of a suitable block, in black or monochrome at a suitable angle on this neutral-tinted surface, will give the colour design—all that is necessary is that the block shall be cut in lines corresponding in number approximately to the series of colour lines. To take the simplest case. If the paper is covered with fifty series of colour lines to the inch, and we take a block consisting merely of fifty straight lines to the inch, the thickness of each line being equal to one of the colour lines, and print this in black on the paper so that the lines of the block are at a slight angle to the colour lines—what will happen? In one portion of the paper all the violet lines will be covered by the black, and the uncovered red and green lines will fuse and appear yellow to the eye. A trifle further along the green lines will be covered, and the blue and red will fuse and appear purple, whilst where the red is covered the appearance is blue-green. Where the black lines cover part of one colour and part of another, intermediate tones will appear. The whole effect, therefore, is to produce bands of rainbow colours right along the paper. If the angle between the colour lines and the block is only of 2 or 3 degrees the bands will be broad; as the angle is increased

they become narrower. If the straight lines of the block had been the thickness of two colour lines instead of one, the resulting colours would be different, *viz.*, those of the original colours—and, of course, admixtures where the lines are partly covered and partly uncovered. If, instead of having the same number of lines to the inch on the block as there are series of colour-lines on the paper, we have a slightly larger or lesser number, we again alter the effects.

By taking curved lines, zigzag lines, crossed lines, etc., etc., instead of merely straight lines, an absolutely infinite variety of patterns can be produced, whilst the colourings may be changed by altering the ground colours or the thickness of the lines of the block, and also by having the final superprinting in colour instead of in black. In the last case, of course, the tone of the colour adopted will more or less predominate in the colour scheme. The accompanying illustration made by Mr. Rheinberg's process will give some idea of a few of the simpler effects which are obtainable, and so that our readers may form a better idea of the process, we also give an impression on white paper of the block with which the colour print has been made. It will be observed that the three different patterns at the bottom of the page are produced from the same "wavy-line" block, merely set at different angles to the colour lines.

We understand from Mr. Rheinberg that for his experiments the colour lines have been printed on the paper by means of electros, but the production of the colour lines in one operation by means of a rotary machine is at present under contemplation, in order to cheapen the process. It will be noted that any printer having this paper will be able to produce colour designs by a simple impression in black or monochrome, provided that a few simple rules are observed in the making of the blocks.

The advantages of the process, for which patents have been secured in Great Britain, Germany, France, the United States and many other countries, may be briefly summarized as follows :—

(1) Novelty, as any number of colour designs can be produced, which it would be practically impossible to produce by other means.

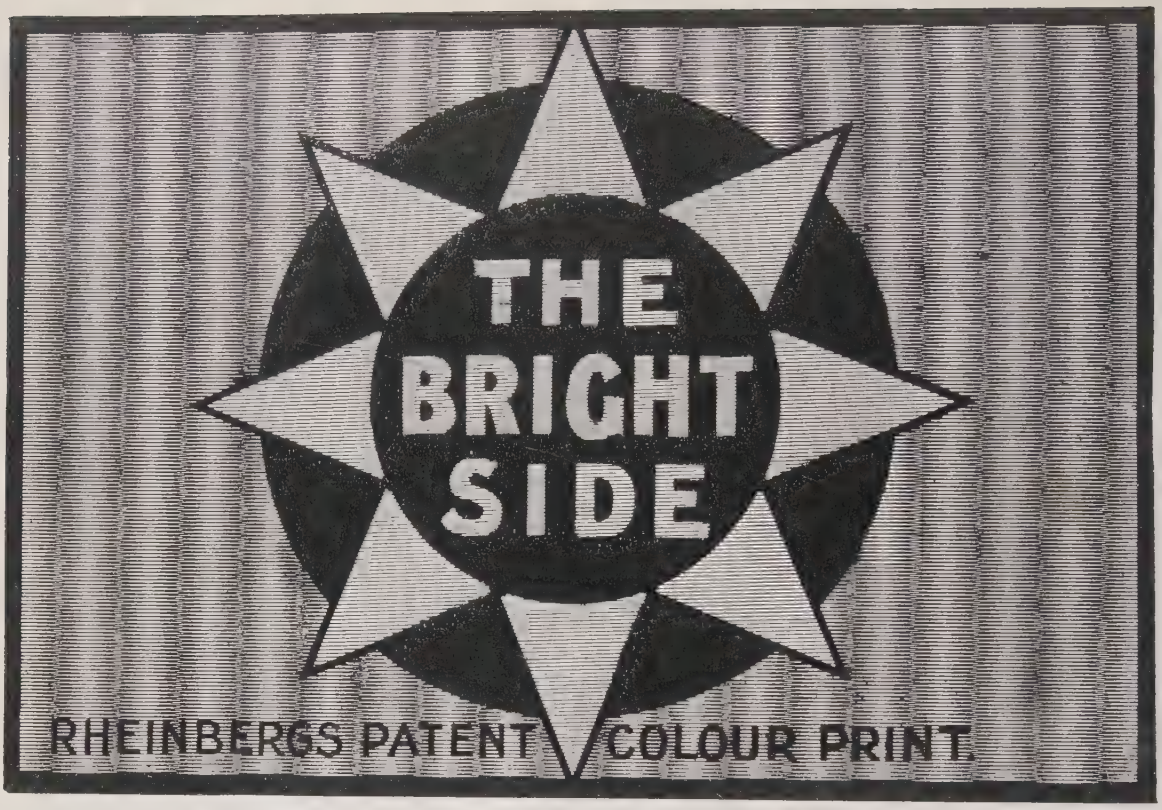
(2) A single block suffices for the complete design, in black and colours, and in many cases even the same block can be utilized for several colour designs by merely altering the angle of printing.

(3) Only a single printing.

(4) There is no question of registration, as there is no attempt to reproduce pictures in which a definite colour must appear at a definite spot.

As to its applications, they are manifold. For advertising in all its forms—in circulars, magazines, periodicals, for show-cards, posters, and so on—it should prove invaluable. It appears equally suitable for book-covers and for marbled papers ; for box papers and fancy papers of all sorts ; and it should even be susceptible of adaptation for wall-papers.

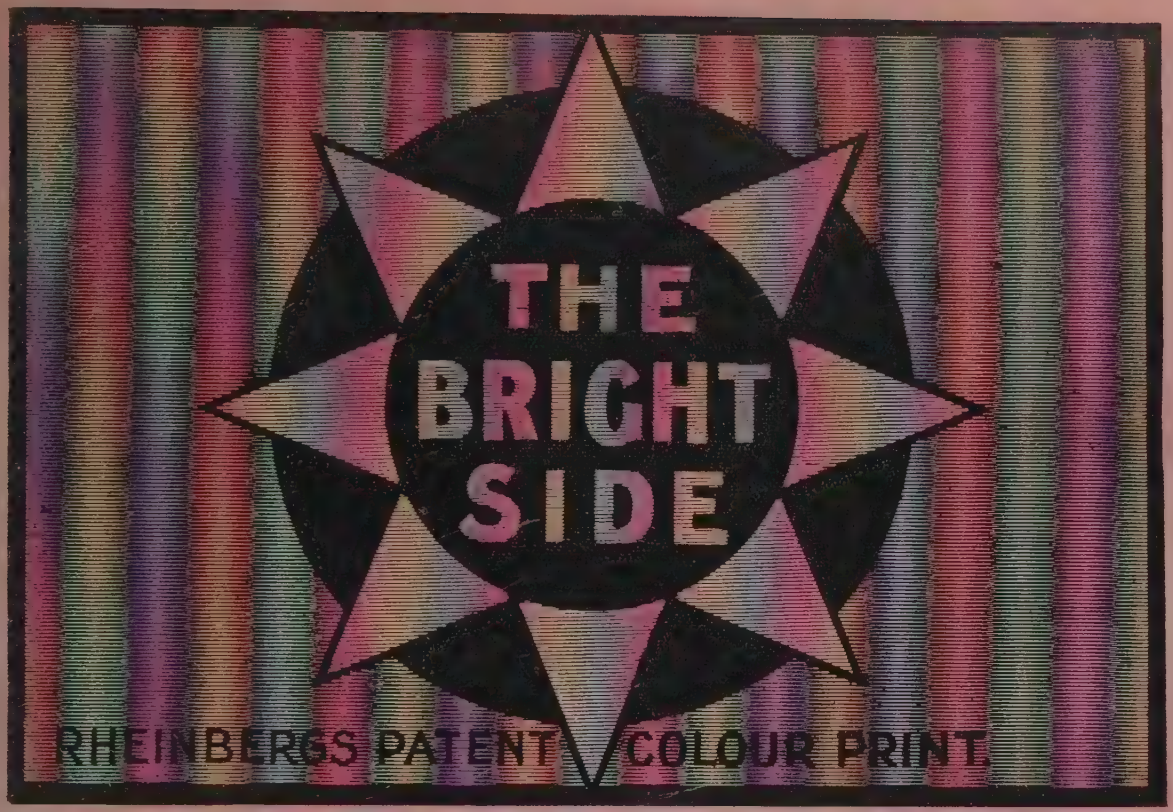
In short, the invention seems to us to be one of which considerably more should be seen and heard in the near future. Probably before long we shall have the curious spectacle of printers who have only black ink on their premises turning out colour designs without changing the inking rollers on the machine.



Rheinberg & Co.,
32, Snow Hill.

The Single Colour Printing Plate.

See article "A New Colour Process" and compare with finished print opposite.



Rheinberg & Co.,
32, Snow Hill.

The Single Colour Printing Plate.

See article "A New Colour Process" and compare with finished print opposite.

RAPHAEL, PINX.

REPRODUCED FROM A STEEL PLATE ENGRAVING
AND PRINTED ON THE "HARRIS OFFSET MACHINE"
BY BLADES, EAST & BLADES,
23, ABCHURCH LANE, LONDON

Offset Printing.

The Advent and Triumph of the "Rubber Offset Machines."

Decorative Initial.

Design and Block by the L.C.C. School of Photo-Engraving and Lithography.

THIS remarkable new type of lithographic printing machine has come so suddenly into the lithographic trade that it is not surprising that there are a large number of printers who have not had the opportunity to fully investigate its extraordinary merits and capabilities.

That it has already set up the highest standard of speed, quality and efficiency in lithographic printing, is now a matter of unimpeachable fact; and withal one which is making itself felt more and more every day, as bearing the most potent development of modern lithography.

It is but the short period of half a decade of time, a mere matter of five years, since its first open entry into the lithographic trade, yet it has already bounded right to the front, and secured the most signal recognition and esteem: in reality, such as no other preceding type of machinery and methods for purely lithographic use had ever done before, a most fitting and appropriate reply to the oft-affirmed reproach that lithographers controlled the most conservative branch of printerdom.

No progressive printer can well afford to ignore the claims and performances of this epoch-making piece of machinery, if he is as he should be—a staunch craft patriot, one who values the excellence of his work. Once it becomes known what it can actually accomplish, it never fails to arouse the most unstinted admiration and interest.

The intrinsic value of this machine lies in the fact that the very finest, as well as the coarsest, class of lithographic work can now be printed from it, upon any class of paper, even the roughest and hardest kinds, and in the most perfect and satisfactory manner yet known, and at more than four times the speed hitherto achieved by the older type of "reciprocating lithographic machines;" thus excelling the "flat-bed" letterpress machines, which hitherto had become the most dangerous rival to the lithographer

This is all done without any additional labour cost in "minding," whilst in another respect effecting an economy in the expenditure of ink, as the sharpest and most crisp printing can here be accomplished with a much thinner film of ink than was hitherto possible with preceding machinery methods.

How this is accomplished may be briefly explained by a reference to the most successful of these new types of machines, that known as the "Harris Rotary Automatic Sheet-Feed Lithographic Offset Press."

It comprises three cylinders, as against the one cylinder of the older orthodox "flat-bed" machines of lithography. One of these cylinders carries the "working plate" of zinc or aluminium, having the printing image upon it. Another cylinder carries a three-ply rubber blanket stretched tight upon its periphery.

It is upon the surface of this rubber blanket that the ink impression is first made from the printing plate; this impression is then retransferred with unerring pressure and precision to the sheet of printing paper, by means of the third cylinder, which takes each sheet separately, and presses it into printing contact with the ink impression, taken up by the rubber-surfaced blanket of the second cylinder;

thus the printing is accomplished in the most perfect manner; giving results unattainable by any other known process of printing.

These machines are fitted with " reciprocating distribution motions " of the most effective type, also " check " or " trip " motions, a " discriminative ductor " attachment, and " graduated feed " for ink supply, and every other essential adjustment that contributes to perfect results in printing, including the only perfectly satisfactory " automatic feed " for cut sheets.

Lying before me as I write are some every day specimens of commercial work, such as letter-headings, invoice forms, bill-heads, etc., done in both black, blue and red ink, and printed on dry hard resistive papers, such as Turkey mill, English Court linen, and bond papers, all done on these " Harris Offset Machines " at that well-known London printery, Messrs. Blades, East and Blades, of Abchurch Lane, E.C., every example being vastly superior to anything ever done from the old direct litho. method anywhere in the United Kingdom.

Another example of lithographic work done from this same make of machine by an American litho. house is the finest example of commercial printing we have ever seen. It comprises a sheet of transfers taken from " engraved stones " with a " machine engraved border " of infinite fineness, all printed upon a tough, parchment foolscap sheet of paper, every " line," " dot," and " solid " being as sharp, firm and crisp as though printed from the original engraving, in fact, it baffles the practical lithographer to discover a fault upon it.

As either " zinc " or " aluminium " plates are necessarily employed upon these machines in lieu of the cumbrous litho stone, they enable finer or sharper work to be transferred to them, to say nothing of their cheaper cost. Then again, there is the advantage gained of the perfectly uniform, and homogeneous printing surface, which these plates afford, coupled with no risk of breakage, besides yielding a perfect immunity from the trouble of " veins " and " chalk spots," which is so common a fault with litho stones and flat-bed machines.

These " Rubber Offset Machines " thus open up a new area of prosperity and possibility to the lithographer, enabling him now to print with both ease and perfection the finest half-tone and grain screen images upon plain uncoated and unglazed papers, which are infinitely more permanent and durable, and absolutely more artistic than the rapidly decaying highly glazed surface coated papers, so indispensably bound up with the typographic relief block process of printing.

Thus less costly, thinner and less weighty papers can now be used for printing photo-process screen pictures; in fact, any class or type of paper, such as fancy-ribbed, grained or crocodile stamped papers may be employed, without destroying their character.

Hence the old trouble of glazed sheets adhering together through contact with moist fingers is removed. Whilst if, in addition, the " high-light, half-tone litho process " is employed, then the acme of this class of printing is attained, and brings back to the lithographer vast volumes of work which hitherto escaped him, through the unaccommodating halting mechanical appliances at his command.

Much of this will be better understood, by remembering that the printing surface which here conveys the ink image to the paper, is an elastic, resilient one: something like the pad of the human finger, it can mould itself into these irregularities, and then immediately resume its normal state again, from its inherent elasticity.

This explains why less ink is required in printing, yet more solid, sharper and flatter impressions are obtainable, and with half the consumption of ink that would be required for the same work done from the flat-bed litho machines.

As much less pressure is needed with these Rubber Offset Machines, the wear and tear of the plate and printing image is reduced to a minimum, so that long runs of 150,000 and over are done with comparative ease on these machines, which, for the same reason, require less motive power to drive them. They are made in four different sizes to suit the requirements of large and small printeries.

Very much more could be said for this new type of machine ; for instance, during printing there is less trouble from " stretching of the paper," and also from " creasing " and " overlapping " on account of the more gentle pressure here employed ; hence there is better register, less waste, and consequently fewer delays, thus yielding greater returns. In fact the makers of the " Harris " guarantee perfect register when the Press is running at 3,500 per hour.

In printing " half-tone " work by the rubber litho principle, we obtain a pure solid dot impression ; not as with the relief block method, where the raised points of the half-tone force the ink from the centre of the dots on to the outer edges, forming a very " obtruding penumbra."

In short, by the aid of this " Harris Rubber Offset Machine," the lithographer is now placed beyond the competition of the typographer, as these machines run much faster than the fleetest of the reciprocating letterpress machines, whilst he has no " make-ready " to delay him, and is further fortified by the facile power of " transferring," wherein he can duplicate at will his original design any number of times, for multiple printing at the one time.

This offset printing is as simple as any process of printing ever brought forward.

Not only has it made its mark in commercial work, but it has also shown its proficiency in colour work as well. Never before has the lithographer been endowed with such golden opportunities for reaping a rich harvest as now.

Thus the century-old art-craft of lithography is now reinforced and enriched with the most remarkable machinery of its history in these " Rubber Offset Presses," which not only extends the sphere of its usefulness and productive capacity, but restores it to the premier position of the reproductive graphic crafts, ensuring its " pre-eminence " and " prestige " for many generations to come.

In addition to the sheet-fed Presses, the manufacturers build machines which can give exactly the same results but are fed by hand. It will be readily understood, however, that the speed of the hand-fed Press is solely dependent upon the powers of the feeder, whereas with the sheet-fed Press such runs as require expedition can be run off at the enormous speed of 5,000 to 6,000 per hour, and we leave our readers to conjecture whether it is the fault of the trade or not now if the modern lithographer cannot reap some of the proceeds of such advantages which the Harris Rotary Lithographic Offset Press has brought about.

The Industrial Application of Collotype.

By JULIUS DANESI.

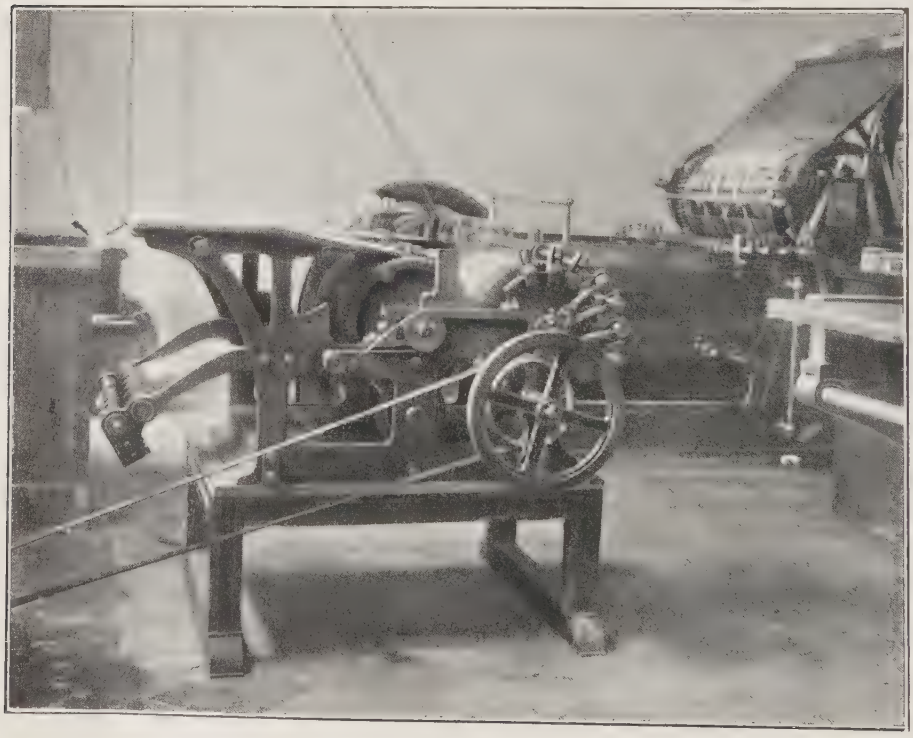
COLLOTYPE, that fine system of photo-mechanical printing, the first process invented in the series of methods of obtaining pictures in printer's ink, attained at first a very great success, but was followed by a period of decadence when other processes, especially that of half-tone on zinc, appeared on the scene—a decadence due, I consider, to the great difficulty of execution on account of its instability.

Thus, one saw the half-tone on zinc and copper grow and develop, and later on photogravure, the three-colour process, photo-lithography, etc.

During this period collotype remained almost stationary, being executed by comparatively few firms, the slight improvement being due rather to the printing machine than to any amelioration in the process itself.

During the last few years, however, it has developed considerably, thanks to the improvement effected in the manipulation of the collotype plates, more especially by the application of mercurial salts to the sensitive stratum, as used by Mr. Castellani since the year 1906.

It is well known how the action of the aforesaid salts, besides making a



ROTARY COLLOTYPE MACHINE IN NORMAL ACTION.

CAPRI - LANDSCAPE

COLLOTYPE IN COLOUR

DANESI - ROME

clearer grain, retains humidity longer, and in consequence a more homogeneous print results.

By degrees, as these improvements followed each other, it became possible to apply the rotary system of printing and also the three-colour printing to collotype. Two years ago, I saw the possibility of applying this rotary system to collotype printing.

To this application there were difficulties of various kinds; firstly, those of obtaining the homogeneous coating of sensitive substances, and securing the adhesion of the same to the aluminium plates, even when they were damped with ammonia.

Secondly, there was the difficulty of obtaining the right elastic pressure to the rotary machine in order not to injure the sensitive substance. Gradually these obstacles have been removed, and at the present moment one can say they are practically non-existent.

The great advantage of this system consists in the rapidity of printing, it being possible to print three times the amount, the gelatinous plates passing with the same velocity under the inking rollers as in the flat bed machine.

The double print, which gives the best artistic results, is obtained in larger quantity than in the simple print of the flat bed machine.

Colour printing in collotype is that which has most attraction for experts in process work, as the system which gives the most perfect results, especially for the abolition of the screen, which spoils the effect of the picture.

It is an undeniable fact that this system of colour printing has gained great advantages through the above-mentioned improvements, which have been effected in the sensitive coating, as colour printing necessitates great homogeneity. Besides, one can print on glazed or unglazed paper.

I am quite confident that shortly it will be possible to print the greater part of collotype with the rotary machine, and collotype in colour will elevate the standard of process work.

THE HEAT OF THE DAY.

ARC ENGRAVING CO.

Photograph by
J. F. SABLICK.

A Novel Engraving Process.

By THE EDITOR.

REFLECTIONS.
Rydal Water.

ARTHUR COX
ILLUSTRATING CO., LTD.

Photograph by
E. E. HINDLEY.

JUST recently there has been brought under our notice by the firm of Wilh. Scheel & Co., of Christiania, an interesting process, which, while admittedly having little commercial value, yet proves that a picture can be produced with a knowledge of chemistry and engraving without the aid of photography. We give two examples of this process, and the procedure in making these blocks was as follows :—

In the first example a screen of 175 lines per inch was printed on a piece of copper and etched, so as to give the flat tint shown in Fig. 1. The portrait was then sketched direct on the metal with asphaltum and lithographic crayon. After being etched a little the resist was washed off. The firm's engraver, Mr. J. Sorensen, proceeded to finish the study with roulettes and wood engraver's tools.

In the other example, which is a portrait of the well-known Norwegian painter, Fritz Thaulow, who died some time ago, a different method was adopted. A very flat negative was made, printed in the regular way, and etched. After the enamel was removed the plate was put in the powdering box and etched again. Finally, it was finished with roulettes and burnisher. We show the plate in its final stage. The examples are certainly interesting as showing that individuality can be imparted even to photo-mechanical processes by a skilful engraver, but, of course, it is work which cannot be figured out at so much per inch.

REVIEWING THE FLEET.

H. RHEINLANDER & CO.

Photograph by
WEST & SON.

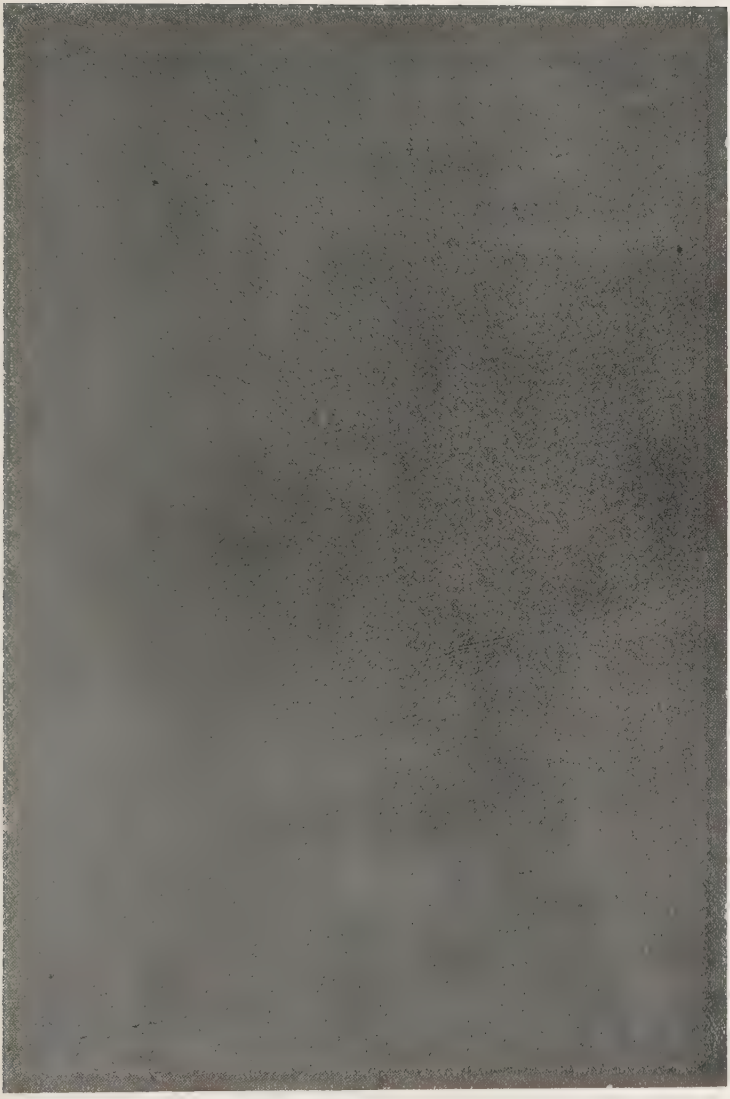


Fig. 1.

PRINT FROM A 175-LINE SCREEN.

This block is the base on which the portrait on the next page was drawn and engraved.

[*See article, "A Novel Engraving Process."*]

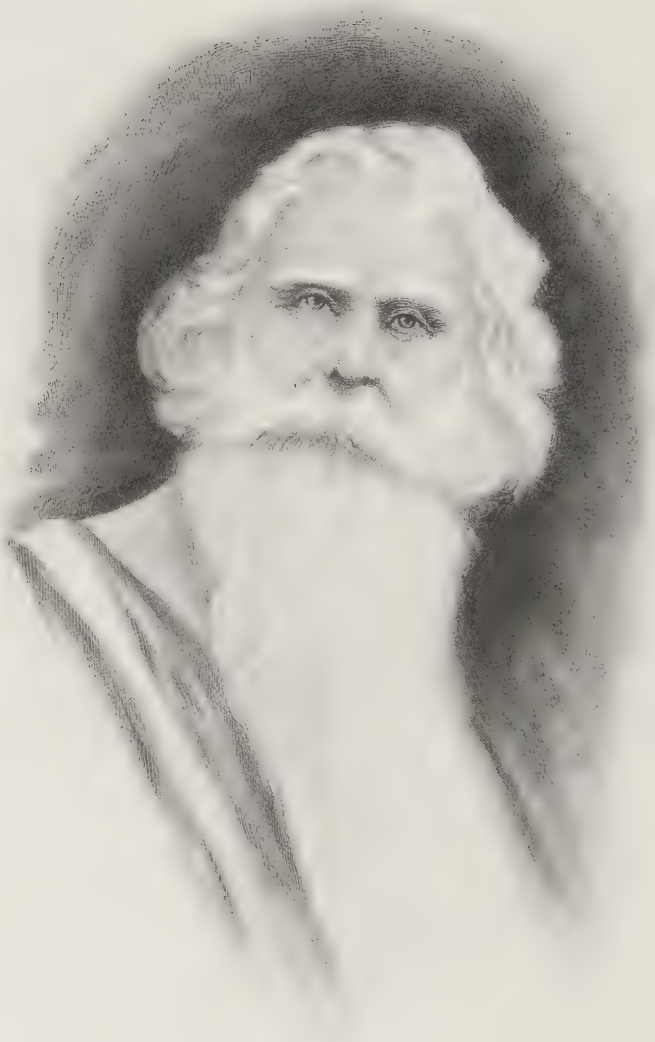


Fig. 2.

Example of a Novel Engraving Process.

Wilh. Scheel & Co.

Engraved by
J. Sorensen.

Wilh. Scheel & Co.

Engraved by J. Sorensen.
See article: A Novel Engraving Process.

The late Fritz Thaulow,
A well-known Norwegian Painter

The Marshall Engraving Co.

Inks by Morris & Bolton Ltd.

Design for a Lift Cage.

By the Penrose Lift Company.

Now and Then: A Retrospect.

By H. W. BRETHERICK.

THE FLOWER GIRL.

EMERY & SON, LTD. Photograph by REINHOLD THIELE.

HEIGHO, how tired I am! And the day's all too short to crowd in all that should be done."

I lit a cigar and sat back in my office chair, lazily watching the smoke-wreaths curling upwards. The ordinary staff had left and I was alone. The day had been a trying one, what with the summer heat and the pressure of business, and everybody was jaded and weary. There were a few matters I intended looking into before following in the wake of my men.

Trade was bounding along; the copy-boards were always full up with work marked (as usual) "Urgent." Overtime had been the rule for some considerable time, and I expected a fresh relay of men in an hour or so to carry on the work through the night. All day we had been harassed and bothered as only process workers are bothered, until by the time I had packed off my day staff I was in such a whirl that I scarce knew a router from an atzpinsel.

I must have been sitting for some time as darkness was coming on, and, strange to say, the night staff had not turned in.

"This won't buy the child a frock," said I to myself, and I took up the first paper to my hand—a worked-up photograph of a chair.

"Hum! A trial order. Big firm. 'Must have some sort of block by noon to-morrow,' eh? Big order hanging on quality and despatch. Think I'll have a pop at it myself and show my chaps the old man is as good as any of 'em."

I stumbled across into the studio muttering to myself, "Must have block by noon to-morrow. Block by noon. Block by noon."

But—what was wrong with the place? In the half-light it seemed smaller and emptier than usual.

"Dim light. Block at noon—Block by noon," rose to my lips.

Still, things had a familiar appearance somehow and I took it as being all right.

"I'll switch on the lamps," said I. But somebody had stolen the switch! I fumbled at my vest pocket, found a match, struck it and lit a glimmer of gaslight.

"Block at noon. Block at noon" kept hammering at my brain as I turned into a dark-room. The switch had disappeared from there also, so I lit another match and then an oil-lantern (yellow) of villainously antique type that was hanging over the sink. Even the dark-room felt queer and yet familiar.

"Better put a plate in the bath and then focus up the job for that block at noon," I mumbled.

It was rather awkward to do so, however, for I couldn't find a collodion pourer and had to coat the plate with an eight-ounce bottle, and which, from its appearance, was used for that purpose. Then instead of the usual clean porcelain dish that I favour for the silver bath there was a cumbrous, wood-cased glass dipping bath with the bath in it.

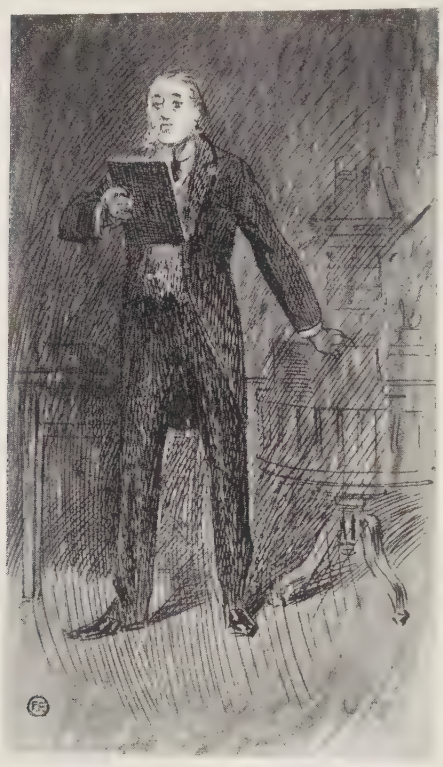
" Looks funny. Must re-arrange this shop to-morrow. My chaps will have to alter their methods," thought I. " They'll lose so much in filtration. Can't stand this with silver up."

Covering the bath I went into the studio again.

Where in the name of Penrose was the big camera ?

" Dash it all, has one of the men taken it for a snuff-box ? "

It was growing rapidly lighter and I could make out the position of things. Sure enough there was no Manchester type of camera visible, and there *had* been one that same afternoon. In place thereof was some sort of quaint arrangement slung in a wooden cradle suspended on runners from a couple of beams that crossed the ceiling.



" Some Sort of a Block by Noon."

" Well, here goes. Block by noon, and they're going to have it if I have to use an old biscuit tin for a camera."

I walked across to the copying board (another freak, made of tongued and grooved boards and nailed to the wall !) and pinned the copy on it. As I turned round I " ducked " my head, through force of habit, to avoid the lamps—which were not there ! I rubbed my eyes and stared again. No, neither lamps nor overhead gear were to be seen. I looked straight up to a ten-foot square skylight !

"Hang the things, what's gone wrong anyway ?" I was getting annoyed. " This is a bonny state of affairs. But that block's got to be done by noon, remember."

I went over to the camera, and, as daylight was now available, I focussed the job up with a lot of trouble. But what a contraption the thing was ! The camera itself was a plain, rigid concern just about suited for giving to a junior apprentice his elementary lessons in making line negatives. The lens was a 26-in. focus R.R. (Frenchman) as big as a young steam boiler, and it had only ordinary Waterhouse diaphragms. The slight reduction required meant about a four-foot extension ! After about ten abortive struggles I conquered the beast and got the image sharp. But, oh for five minutes with my process Cooke and Iris attachment !

" Now about screen distance," said I. There was no screen gear !

I sat down and said things for fully five minutes. It *was* annoying, but I was desperate.

" I won't be beaten by a blooming cigar box and half of a pair of specs," I shouted. " Block by noon, and block by noon it is going to be."

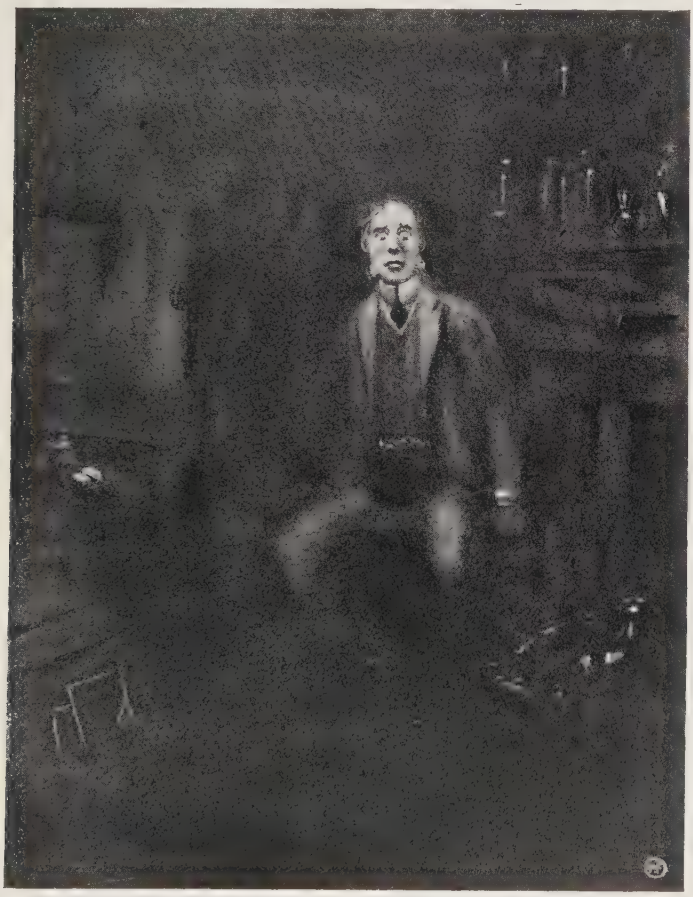
I tossed the focussing cloth—a piece of velvet as big as a blanket—across

the room and rushed to the dark-room to save my plate. Having taken it out of the bath I looked into its accustomed corner for the 133 screen

Oh, my good grandmother! *That* was non-existent also.

I dashed out into the studio again—incidentally spoiling my plate that was draining—and frantically searched for that missing screen. But not the slightest trace of one could I find.

"This foolery has got to cease," I gasped as I sat down on a nitric acid



"I Sat Down for Five Minutes and Said Things."

carboy and wiped my streaming face with a dragon's-blood dusting brush. "Block at noon, eh? Yes, and block at noon it's going to be, if I make a line job of it."

Happy thought! Make a line drawing on the photograph with fixed Indian ink and bleach out with mercury. Then make a line zinco and be independent of screens.

I started up and got to work again. There was no fluid ink to be found. A lot of searching discovered a dirty bit of Indian ink stick, and, to the accompaniment of "Block at noon" and remarks of a comminatory nature, I eventually

produced a few drops of a greasy, brown-looking fluid that I swore would have to do. I was just beginning to outline the photograph when I thought "Suppose I make a hash of it? Better copy the print." So I ran down the stairs, meeting a lad I knew at the foot.

"You know Jackson's in High Street?"

"Yes, sir."

"Well, go there and ask him to send me a tube of P.O. matt paper, and be as quick as you can."

And I went upstairs again in three strides.

With feverish haste I hunted round for some dry plates, but could only lay my hands on a dusty packet by some maker unknown. However, I got my negative (developed with pyro-ammonia, all I could find) and dried off with spirit, when the boy came in.

"Is Everybody Mad, or am I?"

"Please, sir, Mr. Jackson says he never heard of P.O. matt paper, and will this do? It's the same as you had last Monday."

This was a sheet of plain albumenized and sensitized paper.

"Is everybody mad, or am I?" I shrieked; but the youngster fled.

To make a long story short, I got my outline drawn in, bleached out the photograph, and, after much hard labour, polished a piece of antediluvian-looking zinc, coated it with bichromated albumen and screwed it into a primitive frame, when the lamp question came up again. There was no help for it, so I printed the job by daylight to the tune of "Block by noon."

I had worked myself into a fever by now, and when I successfully powdered and burnt-in my first image I snapped my fingers with joy.

"Block by noon. Oh, ye gods and little fishes! You shall have it. Behold, we *are* the people."

"Now for a few minutes in the Levy Acid Squirt and the job's as good as done."

I turned round to do as I said, but there was no Acid Blast! A row of two dirty, wooden "tubs," apparently worked by a leaky water motor, faced me in the spot where our brand new etching machine usually stood.

"This beats all," I wailed. "And that block's due at noon."

I stumbled against a broken-down litho press, ricochetted on to a ponderous Albion, and—as a key turned noisily in the door—woke up, to find my cigar had burnt a hole in the copy for that "Block at noon!"

And as I looked round my up-to-date and well-appointed place, the while my night staff filed in, I concluded that process engraving had made *some* strides during the past fifteen or twenty years.

Gatchell & Manning.

Printed from Electros.

Expressions.

Reproduced from designs modelled in clay.

Wet Black-leading for Electrotyping Half-Tones.

By THE EDITOR.

THE APPRENTICE.

THE ARTHUR COX ILLUSTRATING CO., LTD. Photograph by W. T. GREEN.

IT has long been a current impression in printing trade circles that electrotypes from half-tones, and especially from fine screen half-tones, are necessarily bad, or at any rate good results are only obtained from exceptional originals when special care is exercised by the electrotyper. There has been much improvement in this respect of late years, since the introduction of the lead-moulding process and nickel electros, yet if the average printer were asked by his customer whether it is possible to take a good electro from a 200-line half-tone, he would express a very strong doubt, even if he did not answer decidedly in the negative. If, on the other hand, he was asked whether it was possible to get a good electro *from an electro* he would unhesitatingly answer "No." It is probable, therefore, that the results we print in proximity to this article, showing an electro from a fine screen half-tone, and an electro from the electro will be viewed with surprise, and perhaps with some incredulity. However, it may be stated at once that they are not produced by the ordinary everyday process of electrotyping. These examples are the results of a new process developed by the Globe Engraving and Electrotype Company, of Chicago, and the essential feature of it is in the use of an apparatus for wet black-leading now being marketed by the Williams Lloyd Machinery Co., of Chicago (for whom Penrose & Co. are the European agents).

Wet black-leading is admittedly nothing new in principle in the electrotyping trade, and numerous attempts have been made to introduce it, but so far without commercial success. Apparently its present sponsors have discovered the one thing wanting to make it practical as it certainly seems to be from the results shown Those we publish are only one set of many excellent examples we have seen. It has been shown to be possible to go on making duplicates in succession, one electrotype from another to the extent of from nine to twelve duplicates without apparent deterioration. It is claimed that by machine or hand brush black-leading with the dry powder there must be more or less filling up and damage to the delicate wax mould, and this would be exaggerated each time a new mould was taken from the electrotype last made. It is not pretended that the new process saves time as compared with machine black-leading; the aim has been rather to improve the result. In respect to time, however, it can quite compete with the older method.

From the depositing point of view the wet method should be an advantage, as it saves the washing or "pumping out" which is necessary to overcome the repellant action to water of the dry black lead, and which some electrotypers seek to overcome by flowing the mould with alcohol—an expensive way of working, whatever its advantages. The wet mould is in any case in a better condition to start depositing on than a dry one, and where it is not considered necessary to force the depositing in regard to time by the metallizing of the mould with iron filings the wet mould could go right into the battery tank after leading. But, of course, the advantage of metallizing lies in its quickening the starting of the deposit. Where an unmetallized mould might take fifteen or twenty minutes to get covered all over (the deposit always starting from the margins), the metallized mould begins to grow its shell all over from the moment it enters the bath. It would seem better, therefore, even with wet black-leading to continue to use the process of metallizing with iron filings, and provided the latter are of the right kind, and applied properly, there can be no possible damage to the mould resulting therefrom. The new process is undoubtedly one whereby electros are produced of wonderful depth, clearness and beauty, and for these reasons it should be of the greatest interest to printers and electrotypers, as well as to process engravers who are interested in getting their half-tones properly reproduced.

The Dry River Valley above Malham Cove, Yorkshire.

Taylor Bros.

A Process Shop for the Small Firm.

By E. A. BAWTREE.

Decorative Initial.

Design and Block by L.C.C. School of Photo-Engraving.

I MADE the acquaintance several years ago of a young man debarred, after an illness, from pursuing his trade. With a trifling outlay and some tips I gave him, he was able to start in a small way as a process engraver. Some notable advances in process work within the last two years have materially facilitated this work, and with a similar equipment thus brought up-to-date, many printing firms could do a lot of their own process work with a saving of expense and, particularly if they are in the country, with a great economy of time also.

Concerning apparatus, as numerically the vast majority of the jobs the average firm is likely to require will go on half-plates, this is the size of camera I would recommend. A suitable triple-extension camera with good rectilinear lens will cost from £5 to £6. The lens should not exceed 7½ inches in focal length. If the camera will extend to 22 inches this will enable the operator to enlarge up to two diameters. Procure a nicely planed and clamped board 6 ft. by 8 ins. by ¾ in. thick. A piece of mahogany mounting board will do A1. At one end fix a little platform on to which the camera can be permanently screwed and high enough to raise the centre of the focussing screen 8 inches above the board. The camera will always be used with the plate in the horizontal position. For copyboard use a drawing board 27 ins. by 20. On the back of this at right angles to it and flush with one of the longer edges firmly fix with the help of iron brackets a piece of board about 12 ins. square. This will enable the copyboard to stand upright on the baseboard. On the under side of this square piece fix two strips just far enough apart to admit the baseboard. If this work has been properly done you will now have a copy board which will always be perfectly parallel with the focussing screen, and an apparatus capable of enlarging up to two diameters or reducing to one-fourth of full size. A pair of small iron fretwork clamps to fix the copyboard in any desired position along the baseboard completes the studio equipment.

What about arc lamps? Use daylight. It gives more even illumination than the most perfect lamps in the world. With a Watkins 2s. 6d. Bee meter every exposure can be depended upon, and if a yard or other portion of *terra firma* is available to use the camera in, placing the whole upon a table there is absolutely none of the vibration against which such precautions have to be taken in buildings containing running machinery. A very little experimenting will determine the best position for the camera to prevent reflection of the sky from the glass used to cover the copy or, better still, the Penrose copy holder.

The wet-plate outfit? Not required. If it were these lines would not have been written. The wet-plate process is all right for the constant user and, better still, for the extensive user, but is not much good for the small and occasional worker. Nor will he have to sacrifice quality of work when he has the Graphic Process Plate to his hand.

It will be observed that nothing has been said about colour filters, half-tone

screen holder, or reversing prism. I would not advise the small man to attempt colour or half-tone work. Send all that to the best firms only, regardless of price. It will pay in the long run. Confine your attention to line subjects. You will find that this covers a very large proportion of your work. Up till four years ago a man who has been the principal printer in a town of fifteen thousand inhabitants for twenty years had never had a half-tone block to print.

Wherever you can use lithography, do so because herein lies, in my opinion, a great advance over earlier methods. I refer to Amphitype. It is so easy, quick and certain, and has another advantage. The process is demonstrated up at 109, Farringdon Road free of charge to all intending users, and defects in their own negatives carefully explained to them. When you must make a block put down an Amphitype transfer on to zinc for the start, as this obviates the use of a reversed negative. It would be out of place here to give details as to zinc etching. I would strongly advise all who can to follow my own example and attend an evening course at the Bolt Court School of Photo-engraving. The teaching is most practical and full of useful tips to all students who show themselves capable of taking advantage of them.

As already stated, by putting an Amphitype image on to the zinc the need of a reversed negative is avoided, but a reversed negative can be made if desired. Set a small pair of callipers to the thickness of the dry plate to be used. Clean the glass side of the plate and put it into the dark slide, glass outwards. Lay a black card on the film to prevent injury from the springs of the slide. After focussing, rack the back of the camera in to the extent indicated by the callipers, and upon exposure you will get a sharp reversed negative.

As to printing, do not use the albumen process. This process is anything but perfect, because however much resist may be put on to the lines it is always separated from the metal by a layer of colloid permeable by water. The Redcol enamel process is theoretically right, and I have found it excellent in working. I have not had much experience with it on zinc, but have justified the maker's claim to its nitric acid resisting powers. In biting on to solid plates of tin I have found it stand two hours in warm 10 per cent. nitric acid with no sign of foul biting.

One piece of apparatus has not been mentioned, though its use has been implied, *viz.*, the pressure printing frame. I will conclude by giving a few hints as to how this will serve as a camera. Wherever the original is in black and white, and is to be copied same size, the best possible way to make a negative is by contact on to a graphic plate in the printing frame. Place the film of the plate in contact with the original. Screw up the frame and expose for a varying time according to the thickness of the paper—say, one minute at 4 ft. from the light of a candle. Where the paper has printing or dirt on the back this can easily be removed with fine glass paper, laying the copy face down on a piece of plate glass. Opaque lumps in the paper can be similarly toned down.

As a substitute for a router and circular saw the small operator will find a boy and a fretsaw quite practical. Use plenty of olive oil on the saw.

Finally, do not let it be supposed that I wish to detract from the value of the splendid process plant with which our respected Editor is able to equip those who need it. The general needs of the small firm are small, but the calls upon the process house are infinite in their scope and variety. While I feel that many a small printing firm could increase its profits by taking up the work in the small way, I have indicated, I believe that the best of everything—cost what it may—is only just good enough for the process house that would really be at the top of the tree.

The Philosophy of Colour and Chemistry of the Principal Colour Pigments.

By CHAS. T. KOCK, Cincinnati, O.

Decorative Initial.

Design and Block by L.C.C. School of Photo-Engraving.

IF the waves which produce a beam of white light be interrupted and forced through a triangular piece of glass, or under certain conditions through drops of water, the undulations of the waves of white light are entirely altered as regards their speed or duration, and we have a series of new waves produced by this interruption. For the sake of making what is to follow more easily understood, we will attach the values commonly known to these undulations, and call them by their popular names. Three colours—red, blue and yellow—are seen in the spectrum. Each colour bears a certain value to the whole. Thus red is five, blue eight and yellow three, to the whole. That is to say, the amount of each colour does not appear to be equal the one to the other. New light, in passing through the prism within, neither receives nor takes anything from the prism itself, but is split up into three other rays. To make this more plain, let us place another prism in front of the first, the thin end of one being side by side with the thick end of the other, thus forming a transparent cube of glass, which should have no effect upon a beam of light passed through it. The result is that the coloured rays produced in the first instance by the decomposition are resolved into white light.

Absorption and Reflection.

But if substances are passed between the sources of light and prism, we may intercept one or more of the rays composing the spectrum. Thus we are led to the rudimentary idea in connection with the existence of colour. Take a beam of light falling on the petals of a rose and another on a sheet of white paper, and you have in the one case the sensation which enables you to recognise redness in the rose and whiteness in the paper. What occurs here is that the surface of the rose petals has been able to break up the white light falling equally upon it and the white paper, and retain or refuse to reflect back to the eye the greater part of the blue and yellow portions of the decomposed ray of white light, so that the red appears by its excess of quantity. In the same way, grass and leaves retain the red portion of the rays and throw back to the eye the yellow and blue portions, which combine and produce the green colour.

Every colour has its complementary or contrast, by which the power or beauty of both is augmented, and the reason for this lies in the simple fact that the complementary or best contrast to any colour is that produced by the other portions of the spectrum, which in the cases just cited are absorbed. Thus, the most perfect contrast to red is the mixture of the two other portions of the spectrum, by which yellow and blue are combined and produce green. The most complementary to blue is the mixture in a like manner of the red and yellow rays, producing orange; and the most perfect contrast to yellow is a mixture of red and blue, namely, purple.

Secondary and Tertiary Colours.

We have abundant proof in Nature's colouring that this is so. Indeed, Nature is bound to follow this rule, which naturally suggests itself to us as one to guide us in preparation of coloured designs; but what can be in Nature without vulgarity may not always be licence in art, and we must look for harmony in the numerous shades of colour which, in scientific terms, we call secondary and tertiary colour-forms, obtained by blending the primary colours in various proportions. Thus from three colours, or the primaries, we have endless varieties of different shades, which may be used with great effect in illuminated printing, and these shades or combinations always follow exactly the same law of contrast as the three primary colours from which they take their origin. Of course, this is a general law which may be safely and easily followed when dealing with the primaries, but when we reach combinations of these different colours, far apart from one another and often complicated in composition, the difficulty becomes greater to calculate what the proper contrast should be. This, however, is merely a work of time and arithmetic; but there are circumstances which tend to interfere with this, as with all general laws, and we may have colours so disposed that, although they ought to harmonize well with one another, they do not, owing to their environment. Thus a spot of red or blue or yellow has quite a different value on a black ground from what it has on a white one. Again, a colour which appears a delicate violet shade or a good green in sunlight, entirely changes its hue when seen in gaslight. Indeed, so much is this the case, that dyed stuffs used for decorations or clothing have to be specially prepared as night or daylight colours, as gas, the ordinary illuminant for houses, gives a light of a totally different composition from sunlight, being charged to a greater extent with red and yellow rays, which, of course, materially affect the reflection from the dyed materials. This may be strikingly observed by looking at any coloured picture under the gaslight and under the influence of the electric light, the effect of which can be arranged simultaneously.

Colour Values in the Spectrum.

In the spectrum, the colours have different spectrum values. That is to say, in measuring the spectrum, the blue portions occupy eight parts, the red five and the yellow three; and these may be taken as the pigment value of these colours. Thus, green is composed of eight of blue and three of yellow; that is, pure green. But there may be infinite varieties of green by varying these proportions, and so on with the other colours which are mixtures of the primaries. These mixtures are known as secondary colours. For instance, if we take green, the colour value of which is eight plus three or eleven, it is equivalent in contrast value to five of red, being more than two to one. Now, as to the media by which the colour principles are applied on the press. The art of illuminated or colour-printing is one totally different from that of the printer or ordinary black letter-press, in so far as the colour-printer has to deal with a variety of circumstances unknown to his brother, the black printer.

If may be taken as a fact that every different coloured ink has its peculiar property, and the chief thing in coloured inks is the difficulty of doing good work. This is in great part owing to the nature of the pigments used for the preparation of coloured inks. These difficulties do not harass the house-painter or the artist, as these arts simply mean the transference of colours with their varnish medium to surfaces by means of a brush; whereas, in colour printing from type or stone, the two common difficulties of the colour separating from the varnish, sticking

to the rollers or types, and hence refusing a clean transference to the paper, are well known to the most rudimentary colour-printer

Pigments Made from Minerals.

The colours used for printing, up to a very recent period, were, with one or two exceptions, entirely of a mineral nature ; that is, they were prepared from mineral substances. Thus, we had dull reds in the familiar ochres and oxides of iron, and the more brilliant though less stable vermilion, a compound of mercury and sulphur. Carmine, prepared by precipitating the colouring matter obtained from an insect (Coccus) by means of alumina and ammonia, was used to a certain extent to brighten dull reds and resist fairly successfully the bleaching action of light. In the preparation of ink for printing from these two latter colours—vermilion and carmine—if the same course were pursued in both cases, the resulting material—certainly in the one case—would be utterly useless, seeing that vermilion, being a heavy mineral substance, weighs about ten or twelve times as much as carmine. It is quite evident, then, that the same amount of varnish which will suffice to produce a good red ink from vermilion will be quite inadequate for the requirements of a carmine ink. The next colour with which we have to deal in the limited range of these bodies, available for the printing of forty years ago, is blue. This pigment is found in a variety of forms, many of which might be, but few of which are, available as a colouring material for the printer. We have ultramarine, which used to be obtained from the somewhat rare mineral called lapis lazuli, but which is now prepared by heating white clay with salts of iron and soda ; Prussian blue, obtained by heating woollen rags or hoofs of cattle with potash and iron, and precipitating the solution so obtained with salts of iron ; smaltz, which is merely blue cobalt glass ground to fine powder.

Permanency of the Pigments.

Light blue or ultramarine ink is always unsatisfactory and difficult to get good work from, the impressions usually being rough and " foxy."

Indeed, to get good work from ultramarine ink takes a very clever colour printer all his time. Ultramarine blue is quite a fast colour in ordinary senses of the word, but when such printing is exposed to the action of acid vapours it rapidly loses its colour and becomes bleached. Dark-blue ink or that made from Prussian blue, is in most senses satisfactory ink to work, the impression being sharp and clear, and the colour always grateful to the eye. There are numerous shades of this class of blue colour—from the purest light to the deep black or china blue. Most varieties of ink made from this colour impart a beautiful sheen or film to the printing. To explain this we must remember that the complementary of one colour is the combination of the other two colours of the spectrum. Thus the sheen or film given from this blue colour is a mixture of red and yellow, or deep golden orange, which is very beautiful, and has now become a favourite with many printers and the public. Precautions must, however, be taken in washing up, as this ink is very apt to dry upon the printing surfaces and spoil the work.

Action of Alkaline Fumes.

Unlike ultramarine ink, that made from Prussian blue withstands the action of acids, but when exposed to alkaline fumes, such as ammonia, it becomes rapidly bleached and loses its colour. This ink should never be used for printing soap labels, the alkali of which in a short time destroys and obliterates the printing. As this ink is almost universally used to impart a rich bloom to fine black printing ink, it should be held in mind that this colour is liable to destruction in the manner

indicated, so that although a temporary good effect may be produced by its use, black work exposed to such influences as those referred to will, after a time, certainly deteriorate in quality. Smaltz or cobalt blue is used in some instances, such as for printing bank cheques and notes. This colour, being unaffected by either acids or alkalies, of course, holds a high place where permanence is a desideratum. The printing from this ink is very transparent, and may consequently be used with advantage in printing in blue skies. Indigo is very seldom used. It makes a good tinting material with varnish and transparent whites, and may be used with advantage along with transparent yellows for foliage greens.

Great Variety in Green Shades.

The number of pigments available for green printing ink is not large, but the variety of shades is great—from the most intense, vivid and brilliant green of the emerald, to sap or deep green. These greens are generally composed of Prussian blue and chrome yellow, which is a compound of chromium and lead. As a rule, inks made from these colours are fairly good in working qualities and give little or no trouble to the colour-printer. Of course, owing to the blue colour which forms such an important constituent of their composition, being subject to bleaching and destruction under the influence of alkaline substances, the chief objection to the use of these greens in decorative work is that already mentioned —the change or loss of brilliancy on exposure. The complementary colour to green, of course, is red, and so the natural taste generally associates these two colours in colour printing—the one enhancing the value of the other. Oxide of chromium is a good green and very nearly indestructible. It is used for bank-note printing.

The principal form of yellow colour, made for decorative work, is that of tri-oxide of chromium mixed with oxide of lead or chrome yellow. This, mixed with clear varnish, yields a good working ink with few drawbacks, and when mixed with pure or Prussian blue, produces all the varieties of green.

Opacity of Mineral Yellows.

Such inks, however, are opaque ; and where transparent tints are required, organic yellows prepared from quercitron and other yellow dyewoods are employed. It will at once be seen that if a tint is required in which the body or bottom colour has to show up through the superimposed layer, this latter must be transparent. A great variety of brown colours exist in nature. These consist in the coarse forms of oxide of iron, ochre, umber and the like ; but the finest browns used in printing are made from brilliant red or vermilion, toned with brown or black to the required shade. As a rule, these inks work well, and the ochre, umber and sienna inks need no dyes, as they themselves act as dyers to the varnish.

Chevreul's Gamut of Colour Tones.

All colours are reducible into tones by means of either black or white. Thus, we have the colours of the spectrum, when mixed with varying proportions of black and white, giving a whole series of graduated tints, all of a lighter or darker quality. Chevreul, in his book on contrast of colours, places upon a circular plane seventy-two distinct colours, which he calls a " gamut." Each gamut comprises twenty tints of the same colour, the intensity of which increases from the centre, which is supposed to be black. By continuing this operation of reducing pure colours with white and black, it is evident that innumerable hues and tones may be obtained—of course, care being taken that the mixed colours

Fashion Work.

Facsimile reproduction of Pencil Sketch showing the use of a Tint.

The London Etching Company.

are not put together in the proportions they occupy in the spectrum, which would cause the destruction of colour and the production of white light. The number of such tints which have already been obtained amounts to nearly 15,000. Of course, such combinations require almost a lifetime of skill and patience, and the question of contrast becomes one of very great difficulty indeed. By studying Chevreul's laws, as laid down in his method of nomenclature, the colour-printer will obtain a complete insight into this important and interesting question.

A Hint on Colour Juxtaposition.

Another matter of great importance in colour decoration is the juxtaposition or nearness of one colour to another. If a mass of red and a mass of blue are placed side by side, the two colours are distinctly seen without admixture ; but if the mass be represented by intermingled stripes of colour alternating the one with the other, the juxtaposition of the two gives the same effect upon the eye as if the colours had been rubbed together in varnish and a purple ink produced. This latter fact should be well borne in mind where an intricate number of colours is intermingled, seeing that it is quite possible to combine two colours, which in mass would be exalted by the proximity of one with the other ; whereas when broken up and forced into juxtaposition, they would produce a most disagreeable effect.

The Advent of the Aniline Colours.

The advent of the coal-tar or aniline colours produced a vast change in the decorative work of the colour-printer, and there rapidly sprang up the desire to use these brilliant hues. Gorgeous posters of rainbow tints took the place of the more sober and sombre wall-bills of olden days, and a wilderness of colour leaped to life on every bill-board in the land. But, like all acute joys, this " fever of beauty " had a short and unsatisfactory life, as it was found that the very light which gave birth to the lovely colours seen proved their ruin. It is well known how quickly the most beautiful coloured posters are thus destroyed. This fading of colour is but the change in molecular arrangement of the particles or molecules occasioned by the chemical action of the rays of light. Of course, that does not matter much so long as we are dealing with poster bills, which need not be permanent, but when such colours are used for book illumination, what may we expect in a few years ?

The Bane of Impermanency.

We have missals and old paintings hundreds of years old, as bright and pure as when first printed or painted. Why ? Because the inks or paint used were compounded with mineral colours, and even then, sometimes, when these mineral colours are improperly mixed, chemical changes are induced which rapidly ruin artistic work. A case in point is the water-colour work of the great Turner, which has to be kept out of direct daylight, the possessors of his *chefs d'œuvres* being allowed only an occasional view of their beauty, because the colours are fading. This great question of permanency is being constantly agitated among painters, and the colour-printer and inkmakers should consider it one well worthy of their most serious thought and experiment.

Emery & Son.

Design by Carlton Studio.

A Study in Line.

By the kind permission of
Messrs. Waving & Gillow, Ltd.

Photograph of an Interior of a Drawing Room.

An interesting suggestion for a Stores Catalogue. The half-tone border being reproduced by a coarser screen in a lighter tone forms a pleasing contrast to the retouched photograph in the centre and has the appearance of a separate grey printing.

Designed and Engraved by the Manchester Wood Engraving Co., Ltd.

The Progress of Offset Printing.

SINCE the more general introduction of metal plate printing in this country some ten years ago, which was also coincident with the sale of American rotary litho machines, great strides have been made. Not until a considerable number of these machines had been sold did the conservative English engineer follow in the footsteps of his American cousin.

Messrs. Geo. Mann & Co., Ltd., of Leeds, were one of the first to launch out with a new rotary machine, which, unlike other English makes, was not a copy of the American type of machine.

Simultaneously they put on the market the first Rotary Offset in the shape of their Patent Rotary Tin-plate printing machine, which has as its principle three continuously running cylinders.

Owing to the unqualified success of this machine, the natural development was their patent Rotary Offset machine, which was built on almost identical lines, the only difference being that the impression cylinder is made half size (*i.e.*, two-revolution) in order to give an easy feed and a printed-side-up-non-smearing delivery in full view of the operator.

In this type of machine the plate cylinder and blanket (or transfer) cylinder are of equal diameters, and arranged horizontally. By this arrangement two very important advantages have been acquired, *viz.*, the opportunity of providing a machine with a most powerful inking apparatus, and the accessibility of plate and blanket cylinders.

It is now generally acknowledged that offset printing is ideal for commercial work. Recognising, however, that this class of work is only one of the many branches of lithography, Messrs. Geo. Mann & Co., Ltd., decided to design a machine which would be admirably adapted for every class of colour work also, from the finest screen and line work to the heaviest solid.

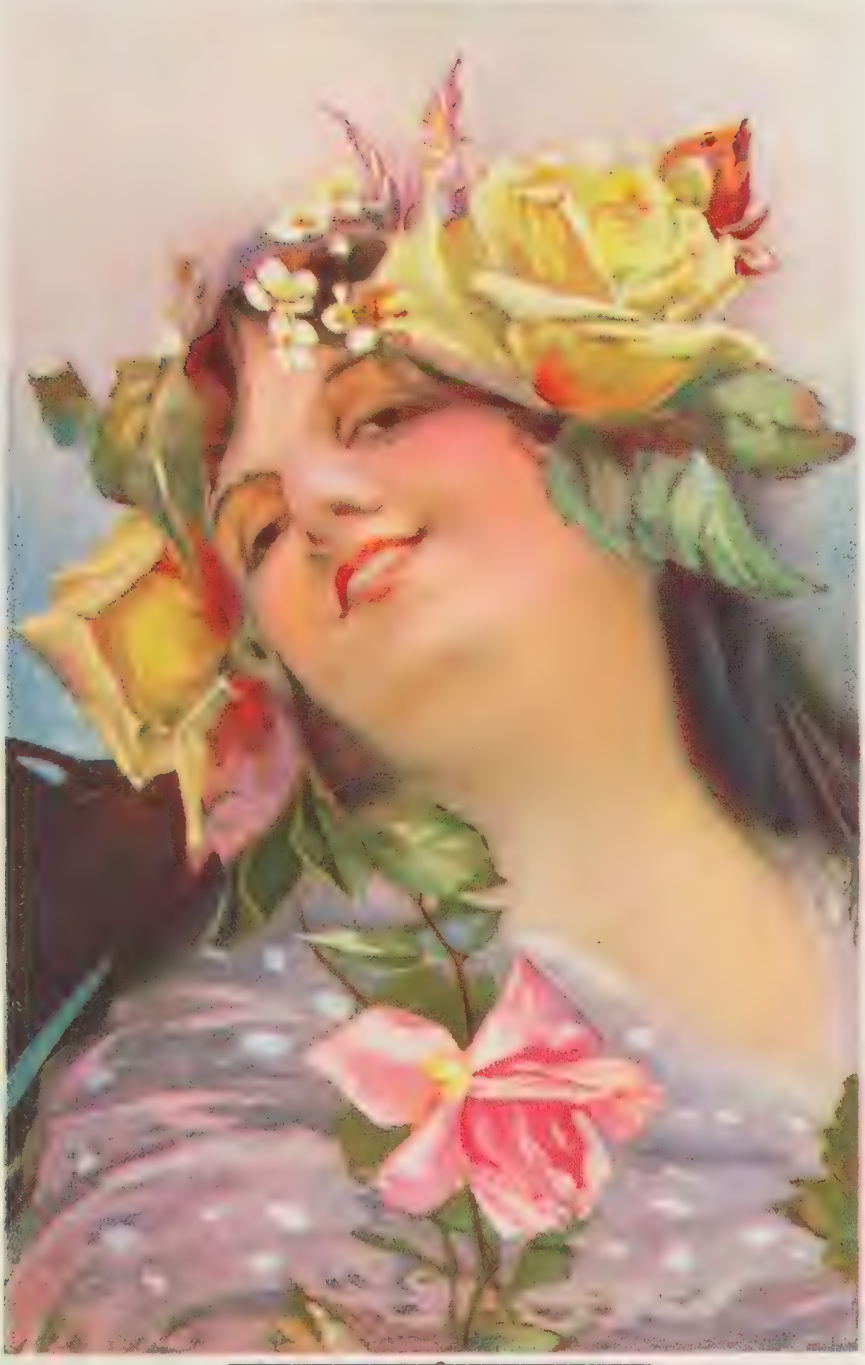
There is no doubt they have attained their ambition, for at present their offset machines are at work in practically every country in the world where the art of lithography is practised, doing chromo work in many colours, survey maps for Government offices (where the tests for register are most severe), and show-cards combining fine stipple and heavy body colours.

It is universally admitted that the offset process will make deep inroads into the typographic world, and thus bring back to lithography much of its lost prestige.

The inset facing this page is primarily inserted to prove that the offset process can show in a few colours a result equal to, if not finer than, anything three-colour half-tone can produce, and on surfaces which the latter cannot print upon.

As a further indication of the progressive spirit which animates Messrs. Geo. Mann & Co., Ltd., it is interesting to note they have successfully applied this new process to a machine for printing in two colours at one operation. The astonishing feature of this machine is that not only does it print the two colours at a speed of 1500 per hour (*viz.*, 3000 impressions), but in five minutes can be changed to perfecting, at the same speed.

The proof of the appreciation of their manufactures can be found in the fact of the support given them by the printing world having placed orders with them for upwards of forty Rotary Offset machines, whilst of their Rotary Tin-plate printing machines about eighty are already working, and no less than about two hundred ordinary Direct Rotary machines are distributed all over the globe.



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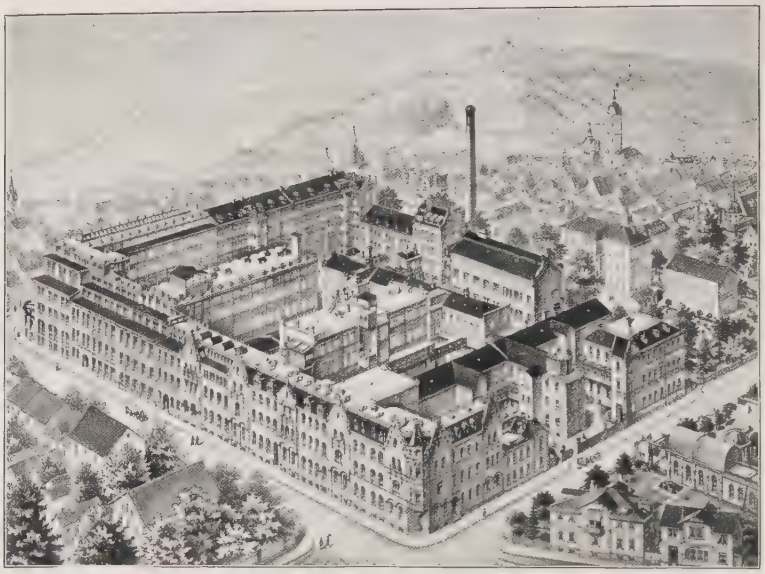

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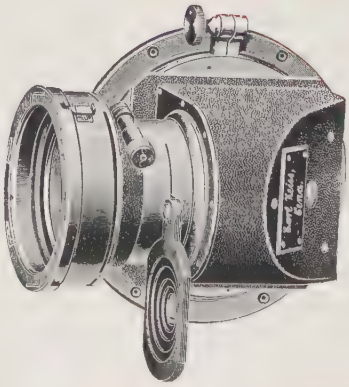

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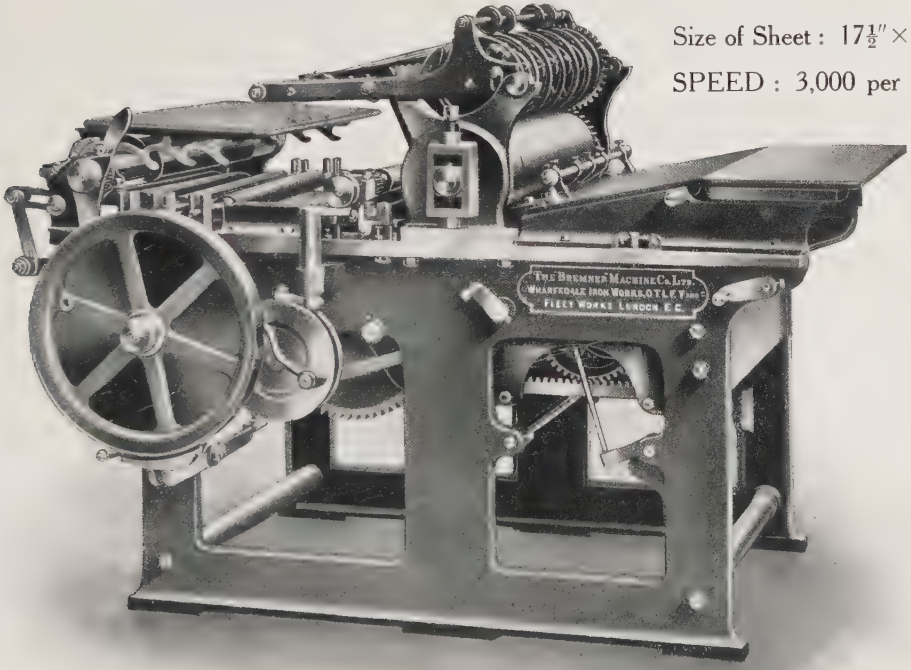

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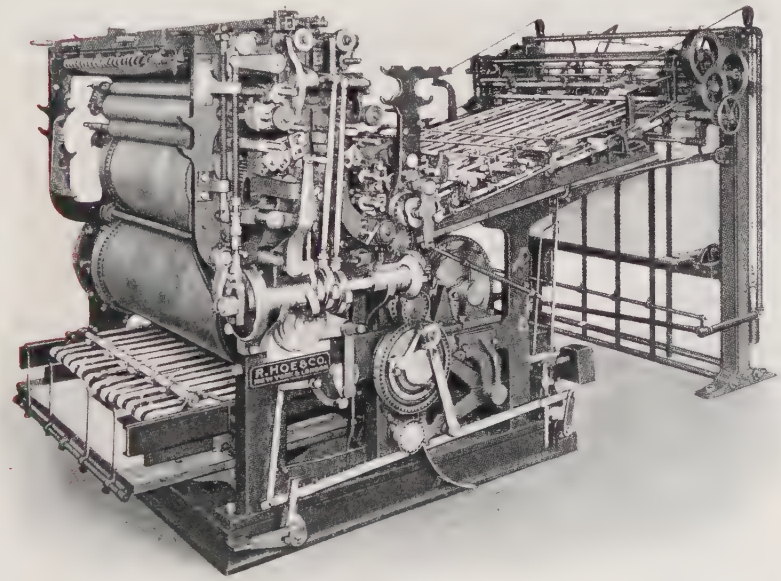

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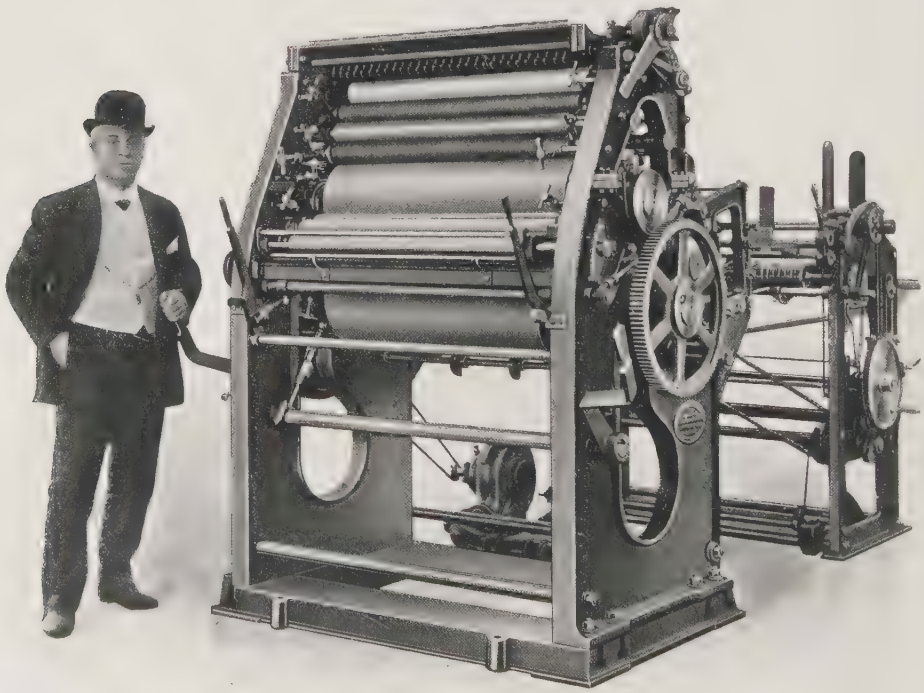

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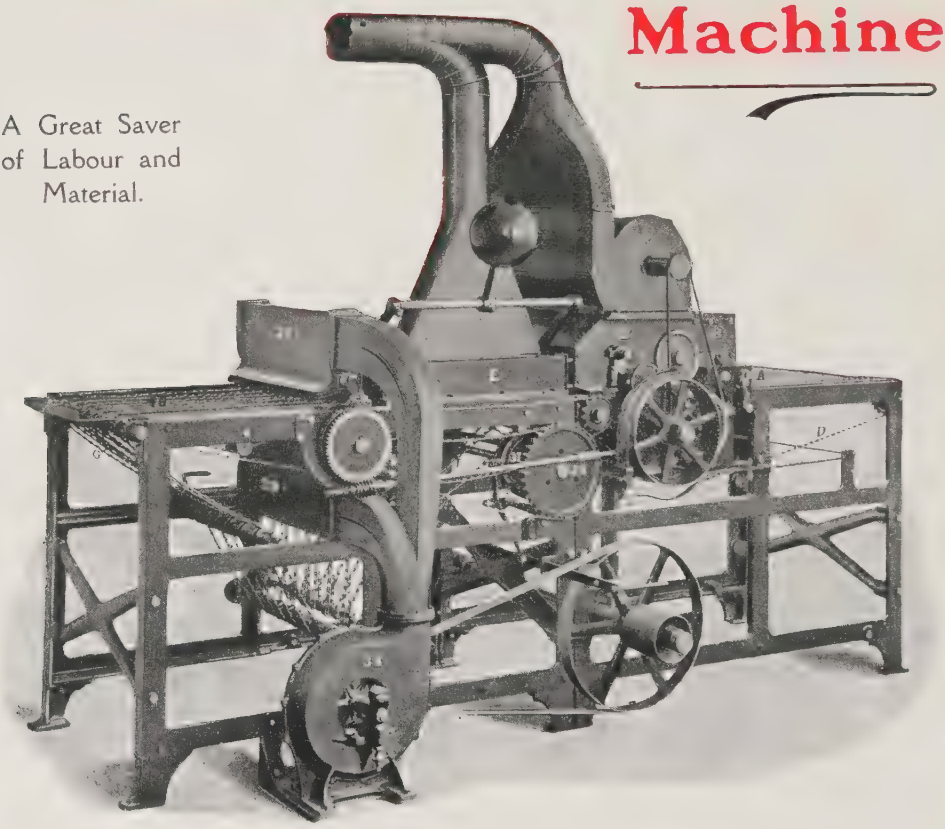

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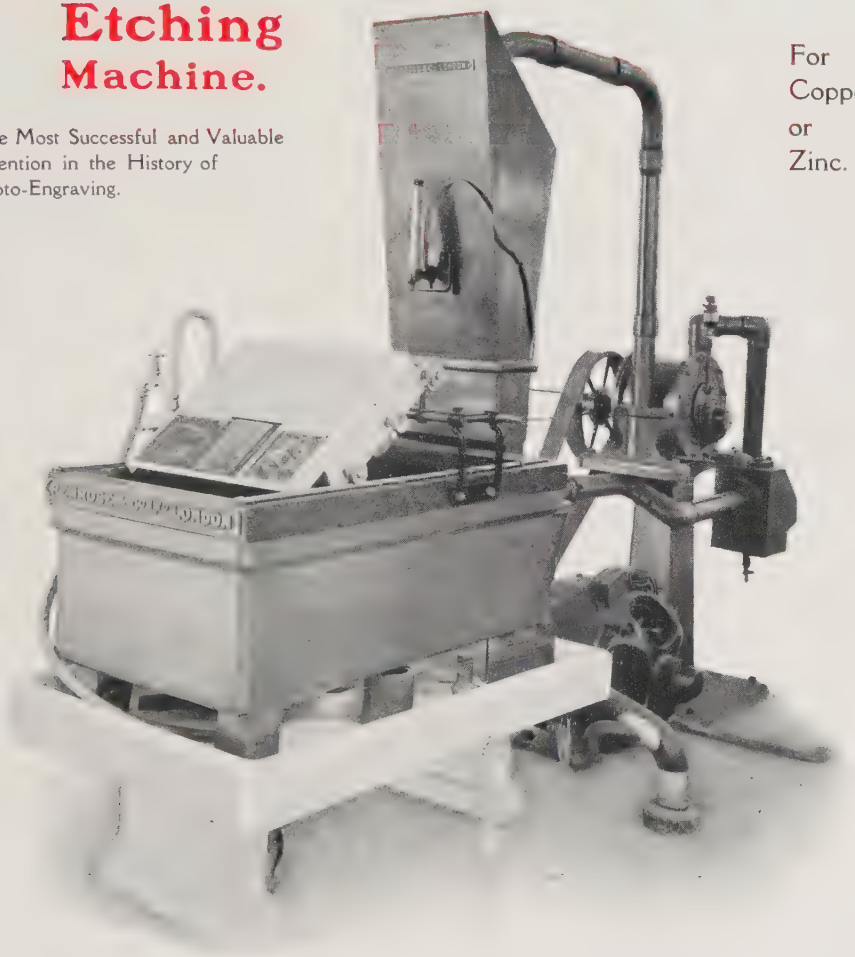

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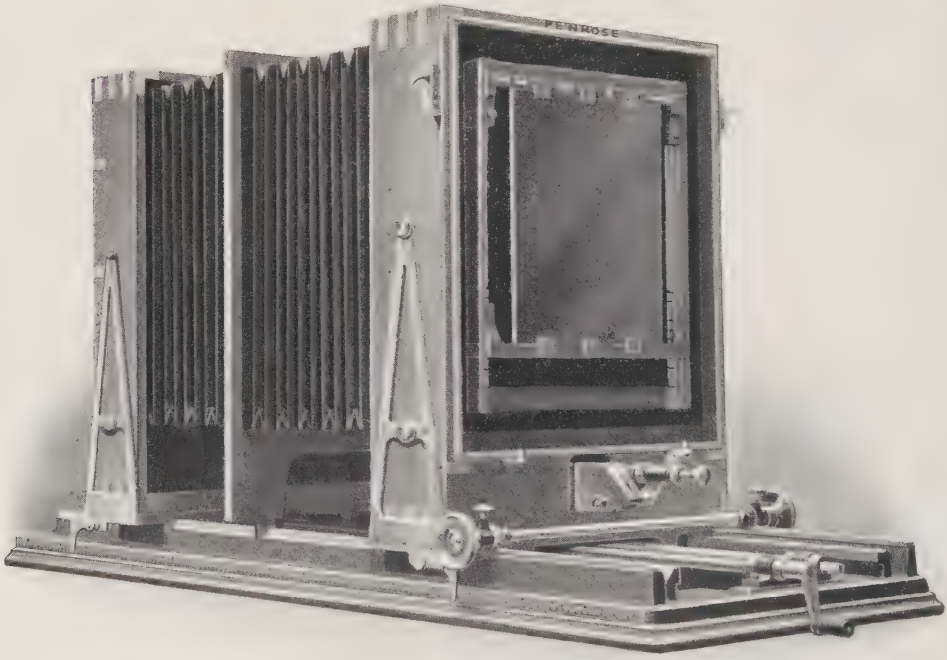

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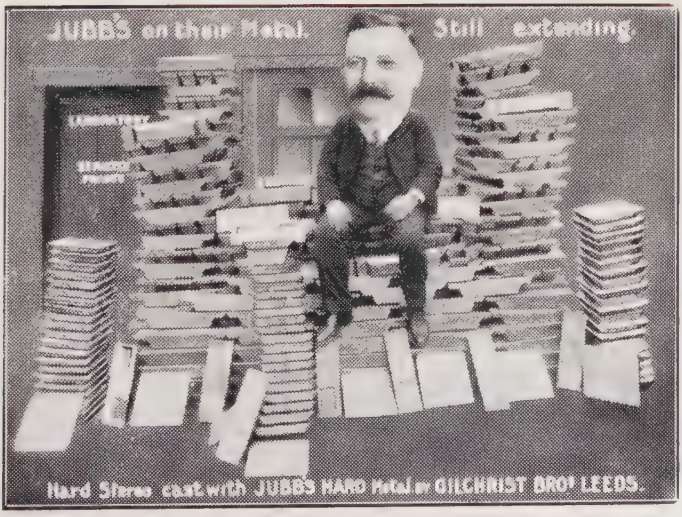

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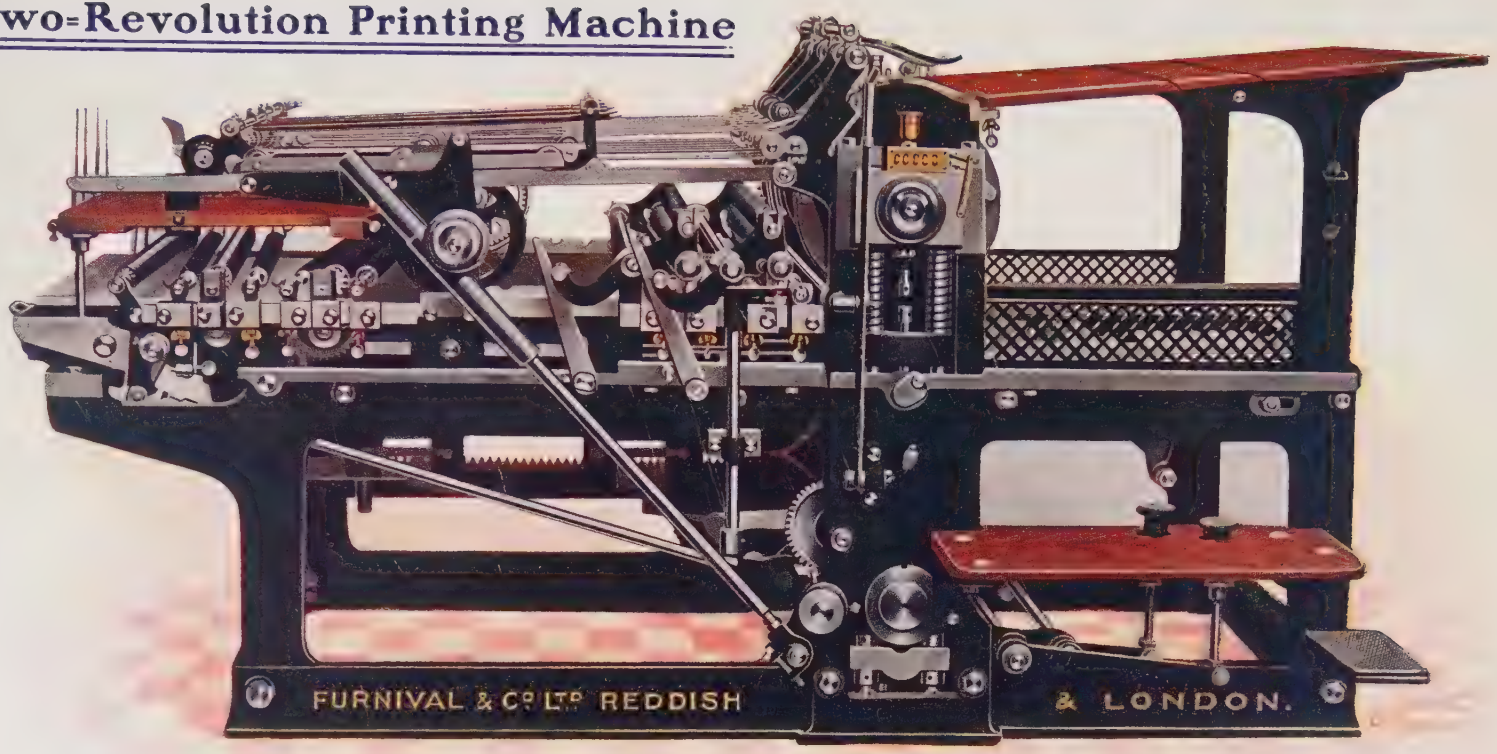

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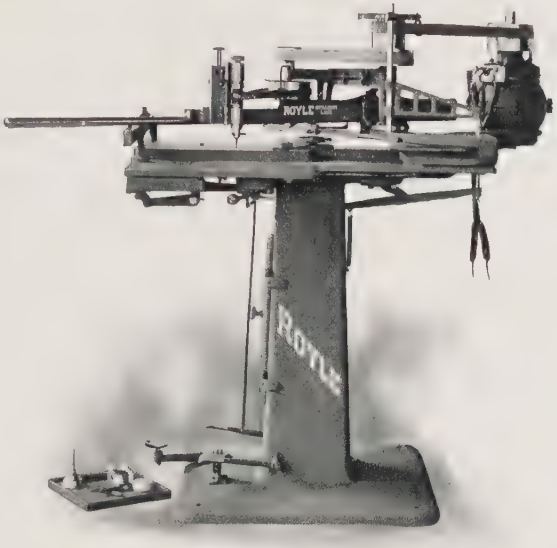

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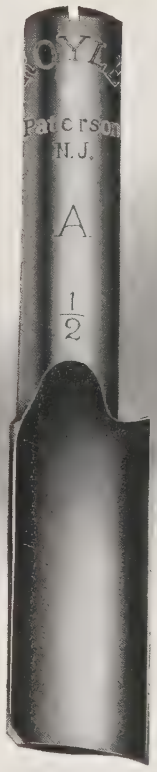

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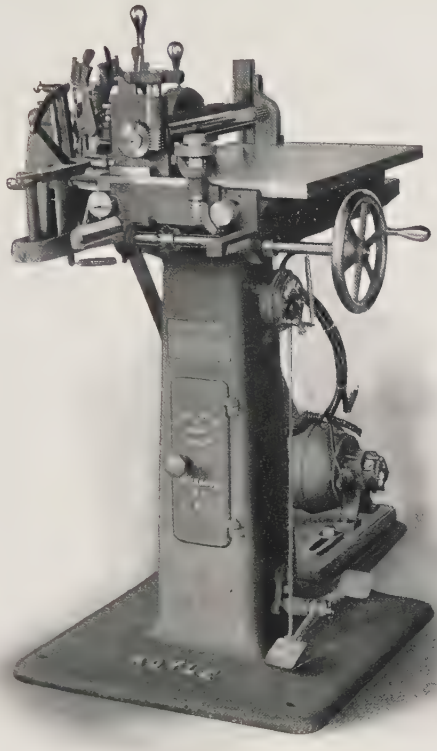

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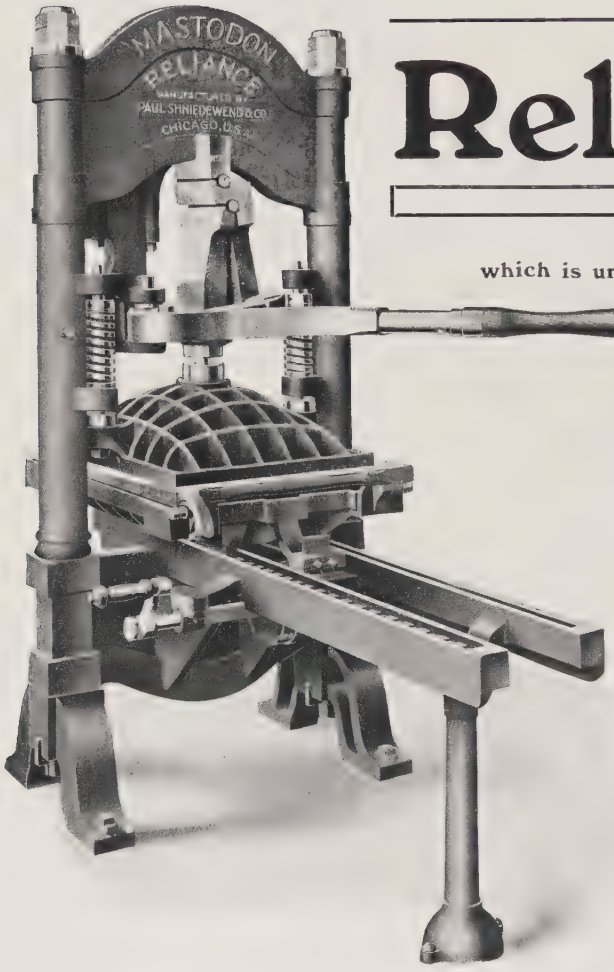

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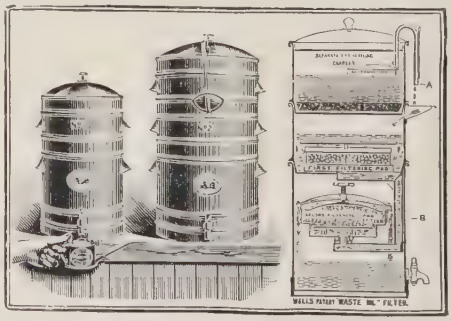

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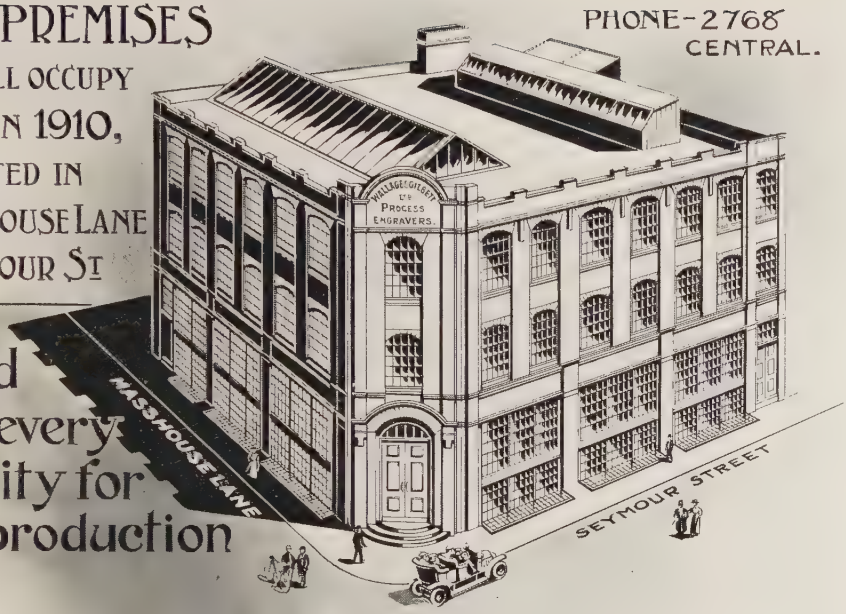

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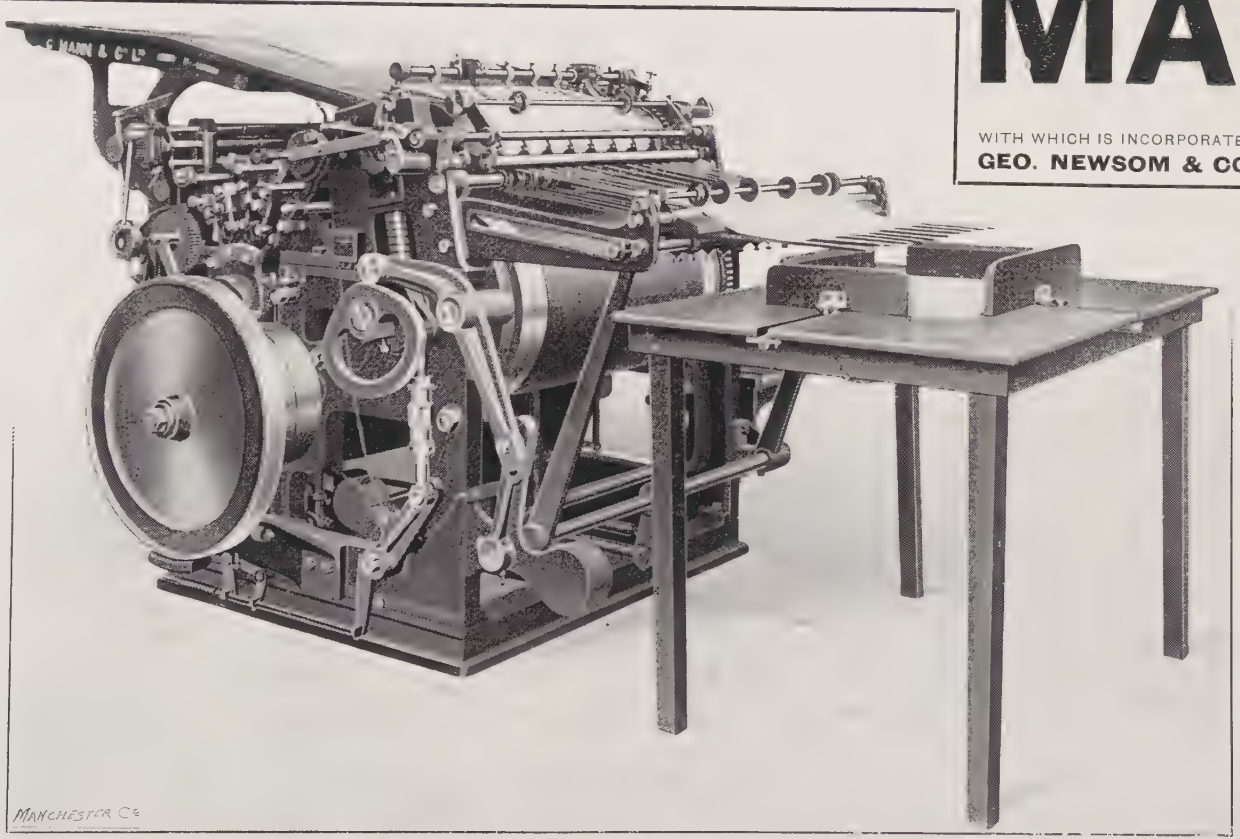

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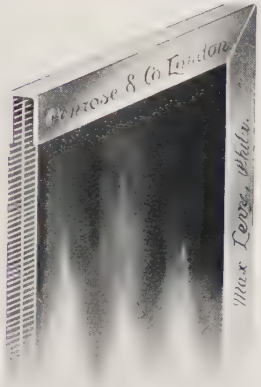

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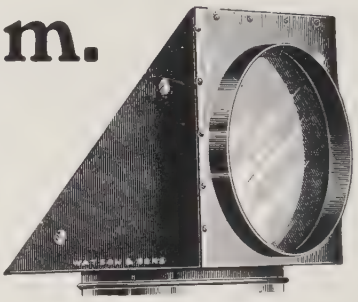

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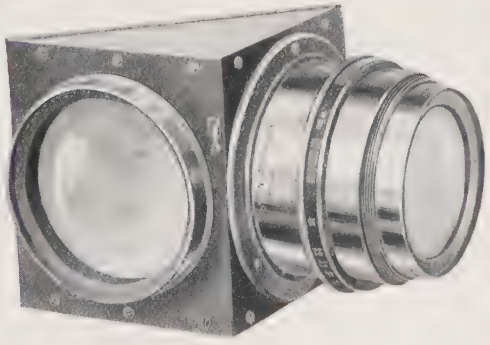

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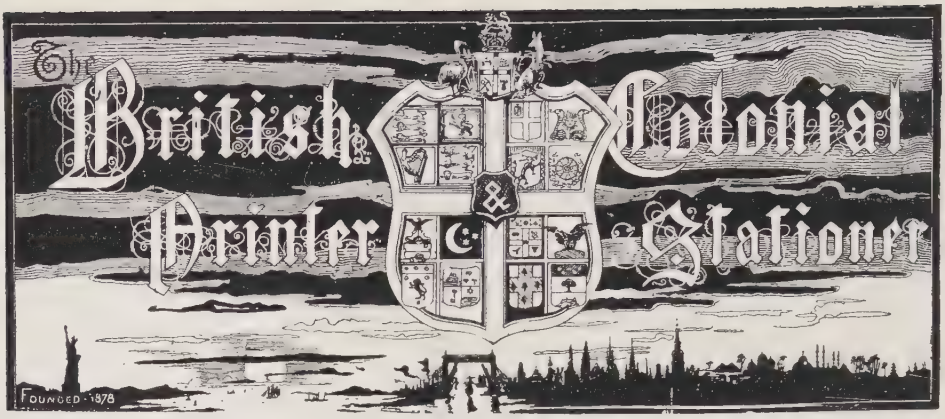

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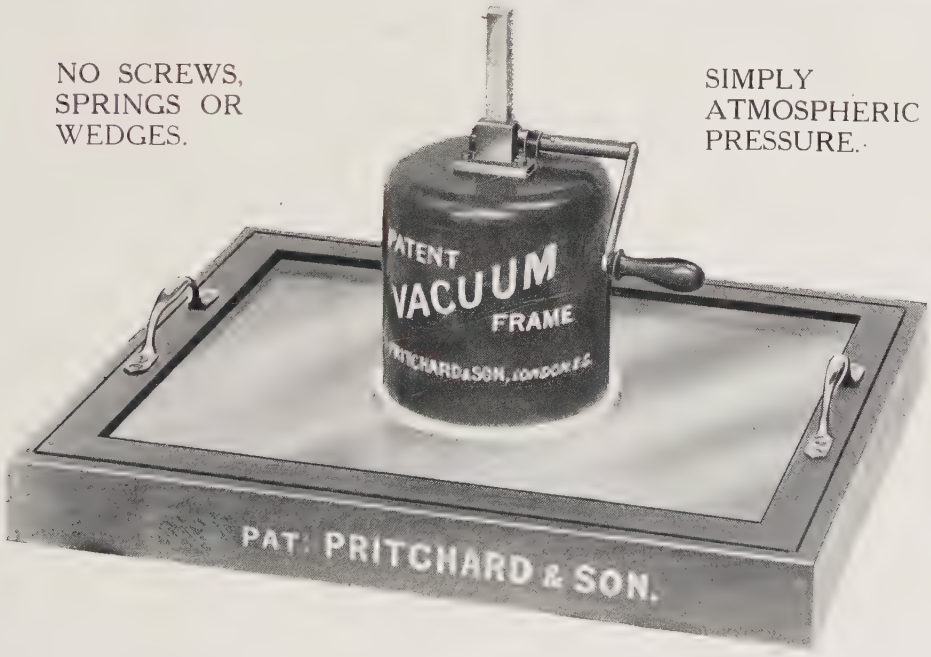

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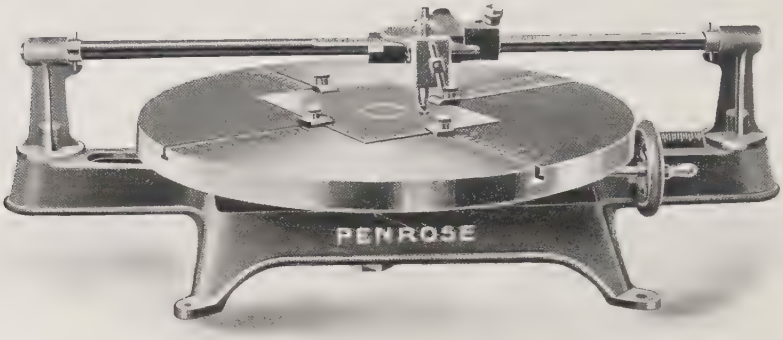

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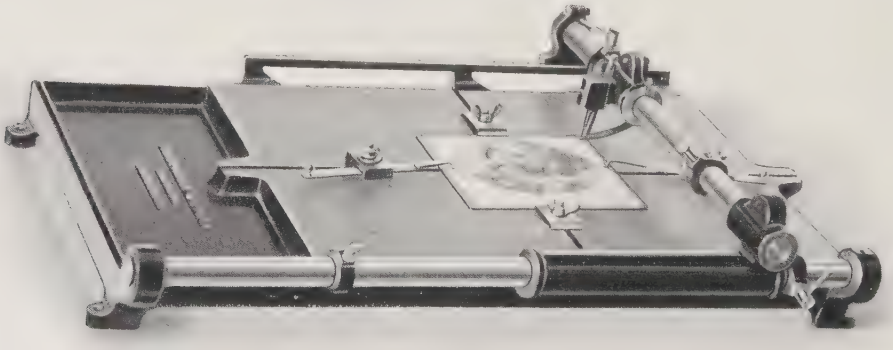

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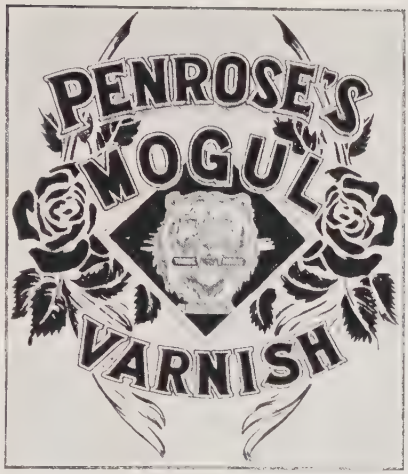

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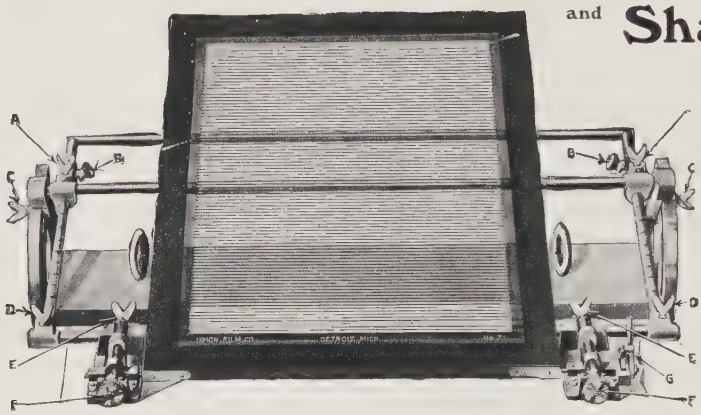

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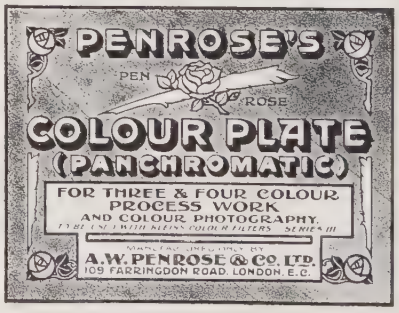

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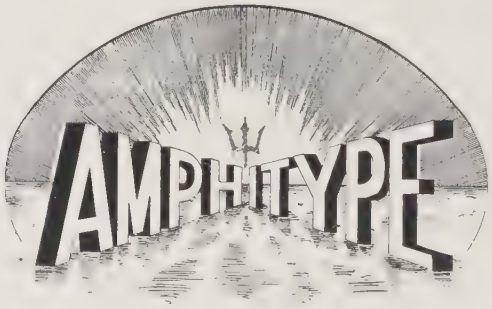

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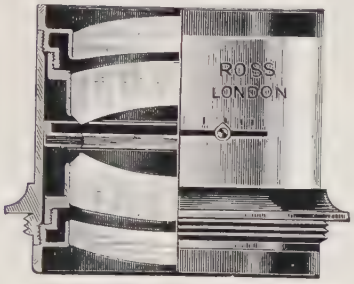

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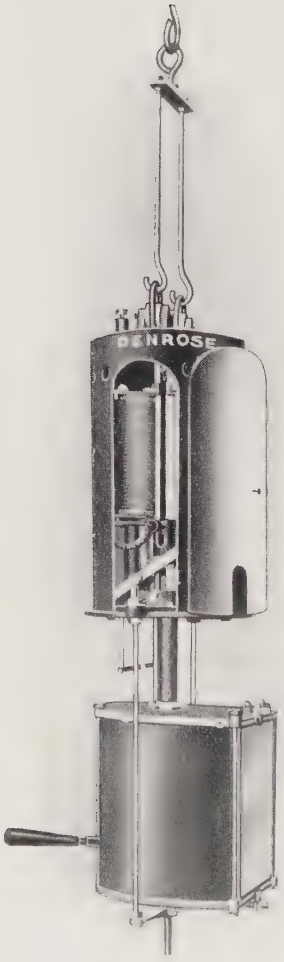

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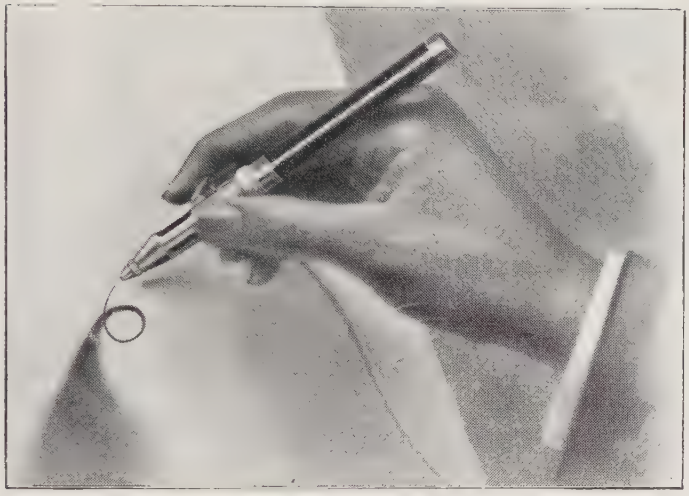

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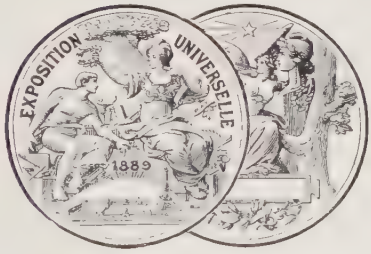

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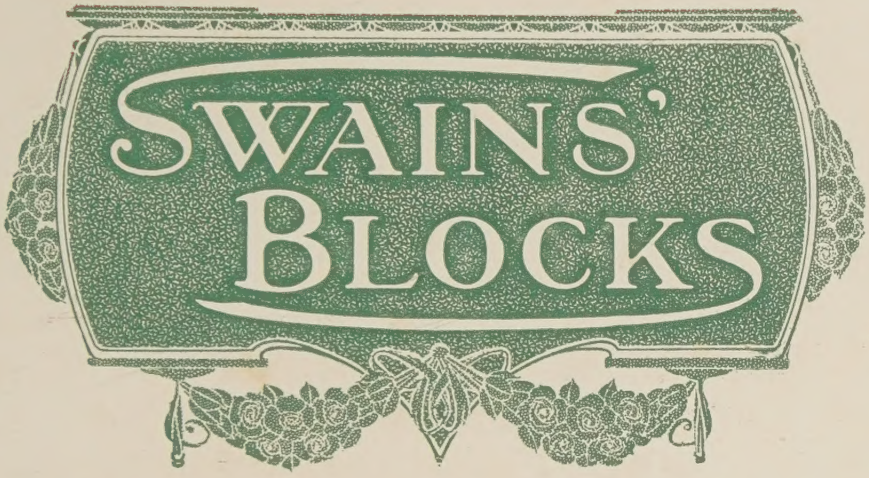

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